REPORT TO CONGRESS

NAVY'S SHIPBUILDING INDUSTRIAL BASE

PREPARED BY

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1. REPORT REQUIREMENTS

Senate Report 113-176, accompanying S.2410, the National Defense Authorization Act for Fiscal Year (FY) 2015, states:

"In testimony before the Seapower Subcommittee of this committee, the Assistant Secretary of the Navy for Research, Development and Acquisition expressed concern about the fragility of the Navy's shipbuilding industrial base. Other Navy officials, including the Secretary of the Navy and the Chief of Naval Operations have expressed similar concerns. The committee shares these concerns and requests the Secretary of the Navy, in conjunction with the Under Secretary of Defense for Acquisitions, Technology, and Logistics, provide a report on the state of the Navy's shipbuilding industrial base not later than February 1, 2015. The report should contain the following:
(1) A comparison of shipyard capacities and capabilities with projected shipbuilding workloads, and challenges this may produce in coming years in terms of capacity utilization and preservation of key design and construction skills.
(2) Investments the shipyards have made in recent years to modernize their production facilities and to recruit, train, and retain their workers, and any challenges the shipyards may face in doing this in coming years.
(3) Investments the shipyards could make to achieve cost reductions on Navy programs or to position the yards to survive a number of years on reduced Navy orders.
(4) The shipyards' construction processes and methods, and how these compare to best practices in shipyards around the world.
(5) The prospects, by ship type, for using competition in the design and construction of Navy ships in coming years.
(6) A comparison of supplier capacities and capabilities with projected shipbuilding workloads, and challenges this may produce in coming years in terms of capacity utilization and preservation of key suppliers.
(7) A comparison of shipbuilding research and development investments with projected shipbuilding workloads, and any challenges that deficiencies in investment may produce in future years in utilizing capacity, preserving of key skills, and continuing innovation.
(8) An analysis of the risks to the shipbuilding industrial base in the Navy's shipbuilding plan in the 2015 future years defense program, and the risks to the industrial base if Congress does not amend the Budget Control Act to increase budget levels for the Department of Defense before fiscal year 2016.
(9) A comprehensive funding section that includes:
(a) An itemized listing of funds budgeted for support of the shipbuilding industrial base. This is to include all applicable Navy and Defense-wide appropriations. Detail must be by fiscal year at the Appropriation, line

item/program element project level with a description of the effort. Detail should be provided over the future years defense program and include up to 10 years of prior fiscal year actuals. This detailed listing is to specifically include funding contained in current shipbuilding programs (detail design/plans), as well as the research and development funding for preliminary and contract design program elements, and any applicable science and technology funding, as well as applicable funding from the Industrial Preparedness and Manufacturing Technology programs.
(b) Any recommendations in the report for additional funding should be identified at the same level of detail as described in the subsection above.
(c) The report funding summary should also provide information on applicable efforts from other related agencies, such as the Department of Transportation, the Maritime Administration, and the Coast Guard."

2. EXECUTIVE SUMMARY

In response to the Senate requirement, this report provides an overview of the state of the Navy's shipbuilding industrial base. The report aggregates information from a number of sources: the Department of the Navy's (DoN) view of the current and future state of the industrial base; a First Marine International (FMI) Benchmarking Update on the major private U.S. Shipbuilders undertaken for the Navy during 2014; input from the major shipbuilders; and information obtained from other related government agencies. The report is limited to naval shipbuilding and does not include ship in-service and repair work performed by both the private and public shipyards.

Today's shipbuilding industry, with its interdependent suppliers and vendors, is a complex system where decisions made today have a cascading effect both in the near-term as well as years into the future. Perturbations in naval ship design and construction plans are significant because of the long-lead time, specialized skills, and extent of integration needed to build military ships. The complex configuration and size of naval vessels result in design times that range from two to seven or more years, and construction schedules that can span up to nine years. Individual ships cost from hundreds of millions to billions of dollars, making each one a significant fraction of not only the Navy's shipbuilding budget, but also industry's workload and regional employment numbers. Consequently, the timing of ship procurements is a critical matter to the health and sustainment of U.S. shipbuilding and combat system industries, and has economic impacts at the regional and local levels. It is important, therefore, for the Department to provide stability and predictability to the industrial base to maintain our ability to continue to build the future Fleet.

The Department continues to focus on stability and preservation of the shipbuilding industrial base in order to maintain the ability to build the future Fleet. A healthy design and production industrial base is critical to achieving DoN priorities and fulfilling Navy

needs. Shipyard production facility, workforce, and research and development investments have provided significant benefits for the shipbuilder and the Navy. These investments support affordability, minimize life-cycle costs, improve and ensure quality products, facilitate effective and efficient processes, and promote competition -- which all support Department of Defense (DoD) and DoN priorities.

Shipbuilding and industrial base stability requires continued close cooperation among the Navy, Congress, and industry in order to balance capability, affordability, and a robust industrial base. A shortage of funding would reverse the Navy's progress towards recapitalizing a 300 ship battleforce and would increase the pressure on the shipbuilding industry. Each shipyard faces challenges as their current workload completes. Lower capacity and under-utilization further impacts shipbuilding affordability for the Department, as well as impacts the industrial base's ability to compete for additional work and make necessary investments in facilities, people, and processes. The DoN will continue to engage and work closely with the shipbuilders regarding capacities, capabilities, and key challenges they face.

Key to stability in the shipbuilding program is funding stability. Because cuts to DoN shipbuilding programs are the least reversible in their impact on the DoN's fundamental mission of providing presence and in their consequences to the industrial base and to our economy, the Department is committed to the maximum extent possible, to preserve ship construction and to seek reductions in every other area first, should budget reductions such as sequestration become reality.

Beyond the future years defense program (FYDP), the Navy's shipbuilding program calls for increased funding to support investment of the OR submarine. The OR program is the Navy's highest shipbuilding priority. As a cornerstone of the country's strategic deterrence triad, there is a strict requirement to replace the Ohio Class submarines on a one-for-one basis as these submarines are retired. If additional funding is not available to support the shipbuilding procurement plan during this replacement period, there will be significant, detrimental impacts on the remaining shipbuilding programs.

Continuing forward, DoN will work with Congress and industry to evaluate opportunities for continued acquisition efficiency and cost-savings. This includes flexibility with the use of advanced procurement funding for long-lead time materials as well as continued use of block buys and multi-year procurements (MYP) in order to enable more efficient and effective shipbuilding and construction schedules.

3. INTRODUCTION

In order to position itself to compete in the marketplace, a shipyard needs to establish a long term forecast of shipbuilding demand and the demand for the various types of ships. Based on this forecast, which includes a strategic prediction of the likely actions of the

government as well as its industry competitors, the shipbuilder positions itself for the future by planning a product range and associated production systems. Using the product range and projected volume, the shipyard formulates a plan to sustain, upgrade or build new equipment, shops, building berths, and possibly acquire existing shipyards owned by other firms. The shipyard invests in research and development (R&D) to develop new products and processes and employs a human capital plan to ensure the number of employees with the right skill mix are trained and experienced to be available when needed with particular focus on critical skills which may take many years to acquire and hone. Capacity, capability, standards, processes and methods, investment, workforce management, labor and overhead cost structure and control are all part of the levers used by the shipyard to best position themselves for the future. These factors all drive the overarching financial model, with the goal of creating an economically sound, financially viable shipyard, capable of delivering high quality products to its customers, providing an adequate return on investment to its shareholders, and supporting sufficient capital re-investment within the shipyard. If all of these factors are not supportive of each other, there are detrimental impacts to the shipyard and Navy, including possible closures, decreased productivity and quality, and increased costs.

The Navy and Congress have a direct influence and a vested interest in the shipyards' and their subcontractors' and supply chain's performance and continued viability. Creating and maintaining competitive environments is a key tenet of the DoD and DoN goals of achieving affordable programs. DoN would prefer to have more than one source for its critical products, and where practicable, promotes dual sourcing options for ship classes with large quantity buys. Dual sourcing creates two additional favorable effects: geographical dispersion of the shipyards which lowers the overall risk to the Navy due to natural disasters like Hurricane Katrina; and competition which drives innovation and process improvements that lead to more affordable ships.

The DoD determines the forecasted demand for ship procurements by ship type through the annual Long Range Shipbuilding Plan, which provides the shipyards with both a near term and long term view. The Navy diligently works to ensure that the near term plan is stable, and that the longer term view provides insight and sufficient time for shipyards to make any necessary adjustments to their long range planning.

Because the shipbuilding industry requires heavy facilities capitalization and a skilled labor workforce, it is difficult for the shipyards to make near term adjustments when projections change suddenly. Demand changes from year to year can result in shipyard lay-offs, hiring and firing cycles, overhead cost increases, and general instability in their financial plans. Subsequent reconstitution of critical personnel would be expensive and add cost and schedule pressure for the Navy.

Consequently, where practicable, the Navy has taken a number of steps to foster stability, including:

- funded R&D studies and projects (Navy Shipbuilding Research Program (NSRP), Navy's Manufacturing Technology Program (Mantech));
- invested in capital expenditure improvements and investments in the shipyards;
- worked with shipyards to eliminate unproductive standards and processes;
- involved the shipyards earlier in the design process;
- promoted block buys and multiyear procurements; and
- supported Shipbuilding Capabilities Preservation Agreements.

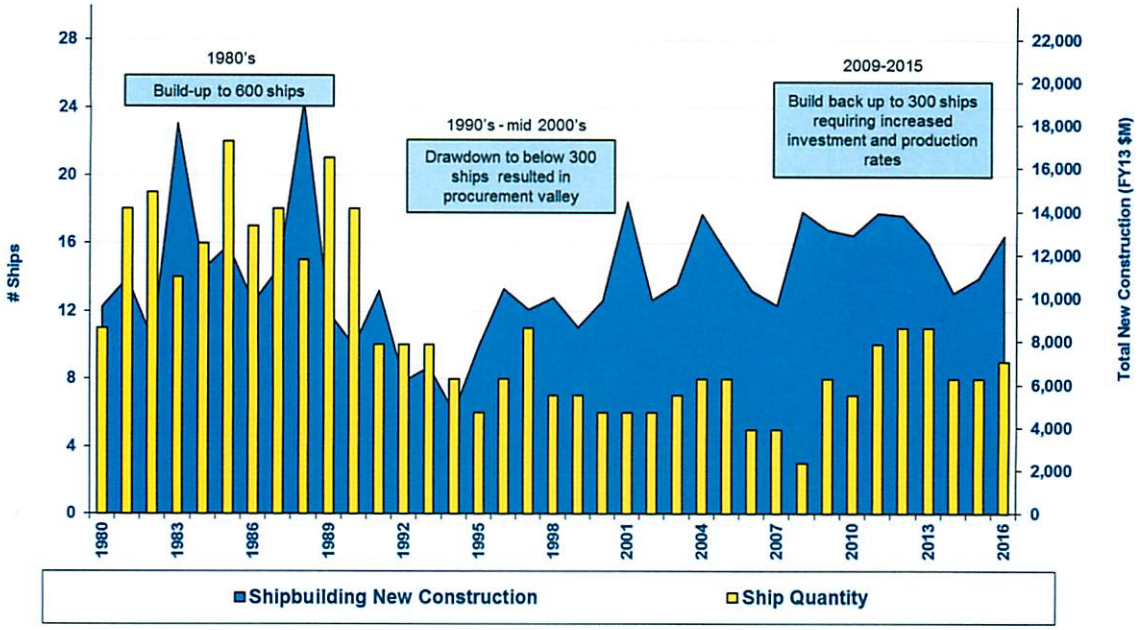
These are the types of critical issues needed to strike a balance and optimization across the industrial base. These investments also have positive benefits for the Navy helping to maintain a competitive, efficient and effective shipbuilding industrial base; promoting affordability; and in turn, supporting a superior shipbuilding and Naval fleet. Continued Congressional support of the Navy's plans and budgets will help sustain a viable shipbuilding industrial base.

4. STATE OF THE NAVAL SHIPBUILDING INDUSTRIAL BASE

The DoN has many shipbuilding requirements and must compete with other national priorities, including other defense agencies and their activities and entitlement programs for its share of the federal budget. The DoN's shipbuilding program must balance warfighting requirements, budget constraints, and industrial base considerations. Naval shipbuilding underpins our current naval superiority and our future readiness. The PB submission balances force structure, readiness, and capability to meet national security commitments. The plan is developed to minimize impacts to the industrial base where possible, in order to avoid future increases in cost above inflation, or perhaps even permanent losses to our national industrial capability.

Continuous ship construction is essential to each shipbuilder's survival. Low shipbuilding rates during the 1990s caused significant contraction of industry. The naval fleet size decreased from approximately 600 ships in the 1980s to below 300 ships in the 1990s to mid-2000s, which resulted in a procurement valley. The subsequent fleet size build up to approximately 300 ships in 2019 has required increased investment and production rates (Figure 4.1).

Figure 4.1: Shipbuilding Procurement History



Eleven different ship classes (DDG 1000, CVN 78, SSN 774, DDG 51, LPD, LCS, LHA(R), JHSV, MLP, T-AGS, and AGOR) are currently under construction. In FY 2014, six ships were delivered (USS *Somerset* (LPD 25), USNS *John Glenn* (MLP 2), USNS *Millinocket* (JHSV 3), USS *America* (LHA 6), USS *North Dakota* (SSN 784), and USNS *Fall River* (JHSV 4)). As of January 2015, 66 ships are under contract (Appendix A).

Figure 4.2 shows the FY 2016 PB Shipbuilding Plan to procure 48 ships through the FYDP for an average of $16.3 billion per year.

Figure 4.2: PB 16 Shipbuilding Procurement Plan

	FY16	FY17	FY18	FY19	FY20	FYDP
CVN 78	-	-	1	-	-	1
SSN 774	2	2	2	2	2	10
DDG 51	2	2	2	2	2	10
LCS[1]	1 + 2	3	3	2	3	14
LPD 17	1					1
LHA(R)	-	1	-	-	-	1
MLP/AFSB	-	1	-	-	-	1
LX(R)					1	1
T-AO(X)	1	-	1	1	1	4
T-ATF(X)	-	1	1	2	1	5
Total	9	10	10	9	10	48
Budget	$14.3B	$16.2B	$17.1B	$17.3B	$16.6B	$81.4B

11 of 48 Ships within FYDP on contract

[1] For LCS, only 1 of 3 ships currently under contract in FY16

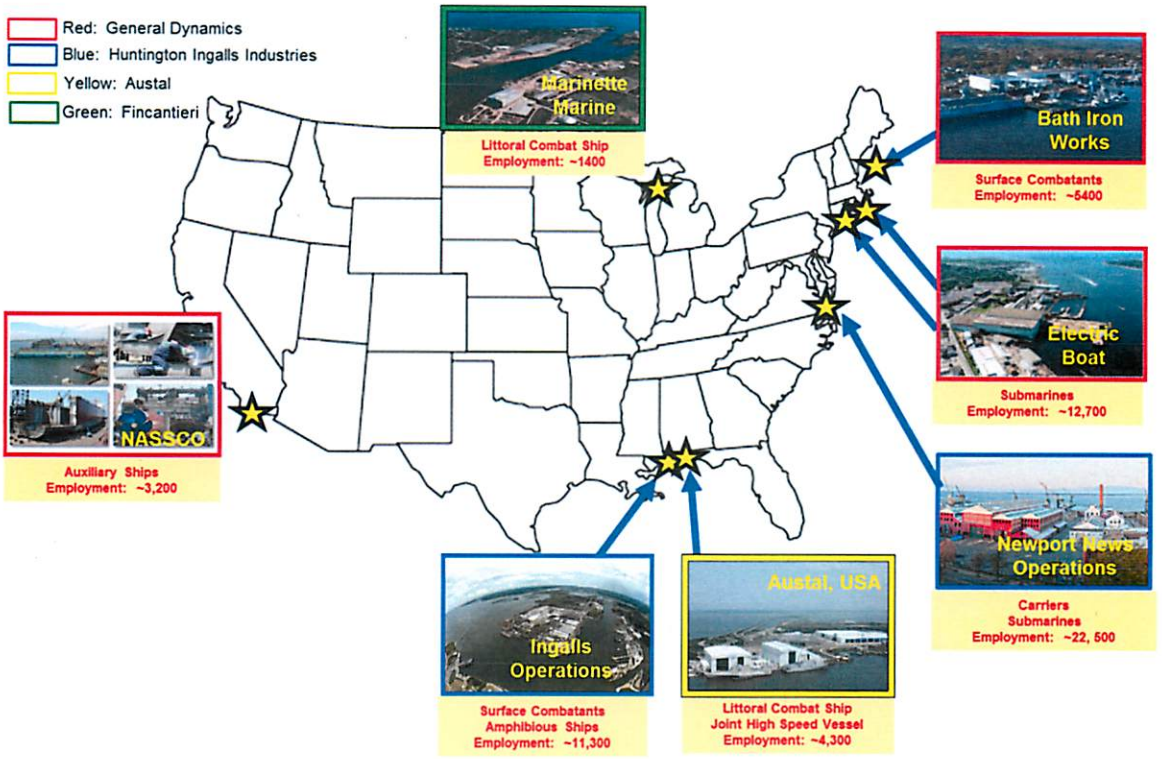
The Shipbuilding Plan is built around stability, balancing near-term and long-term technical and industrial requirements to:

- Enable efficient planning and procurement,
- Train and retain uniquely skilled workforce,
- Support capital investment,
- Sustain the critical shipbuilding vendor base,
- Improve cost performance.

The Navy's shipbuilding industrial base consists primarily of seven shipyards. Five shipyards have constructed naval ships for decades and have heavily capitalized facilities and highly skilled workforces. Two are mid-sized shipyards. There are also a number of other shipyards which typically build commercial ships and periodically enter and exit the naval market. This report focuses on the seven shipbuilders that almost exclusively construct naval ships (Figure 4.3). (Repair facilities or public shipyards are not included.)

- Huntington Ingalls Industries, Newport News Shipbuilding (HII NNS), Newport News, Virginia.
- Huntington Ingalls Industries, Ingalls Shipbuilding (HII Ingalls), Pascagoula, Mississippi.
- General Dynamics, Electric Boat (GD EB), Groton, Connecticut.
- General Dynamics, Bath Iron Works (GD BIW), Bath, Maine.
- General Dynamics, NASSCO (GD NASSCO), San Diego, California.
- Fincantieri Marinette Marine Corporation (MMC), Marinette, Wisconsin.
- Austal USA (Austal), Mobile, Alabama.

Figure 4.3: Shipbuilding Industrial Base



The Navy has taken specific key acquisition and procurement actions to contain costs and sustain the industrial base, including: stabilizing procurements through block buys and MYPs; increasing competition; controlling costs through stable designs and maturity; targeted reviews; cross-program common equipment buys; and a focus on affordability. In addition, investments have been made to support shipyard facility improvements, optimal build plans, conduct of affordability studies, lease for facilities improvement, design for affordability and modularity, combat system open architecture, and shipbuilding capability preservation agreements. Any further contraction of the shipbuilding industry would counteract these acquisition and procurement actions and jeopardize innovation, capability, and affordability.

A stable shipbuilding industrial base is required to ensure minimum sustaining workforce employment levels and retention of critical technical skills, specialized knowledge and qualifications, and experience to meet DoN requirements for an affordable and capable force structure. These critical skills include such roles as steelworkers, welders, sheet metal workers, mechanical fitters/outside machinists, pipe workers, electricians, machine shop operators, planning and scheduling, quality management and inspection, electrical engineering, welding engineering and metallurgy, signatures and survivability, and information and communications technology. Furthermore, the FMI report notes that there are a lower percentage of experienced personnel than suggested by a benchmark for

efficient operations for senior management, engineering, estimating, planning and cost control, production supervision, test and trials, and quality assurance and inspection. Additional information regarding workforce skills, qualifications, and experience is in the FMI report.

The minimum production rate needed to sustain an effective and responsive shipbuilding industrial base depends on a variety of factors that ultimately determine structure of the industry, technology level, and productivity level. These factors include future growth prospects for U.S. shipbuilding (both naval and commercial), future advances in shipyard process automation, changes in shipyard build strategies (such as increasing pre-outfitting, possible new processes for construction and launch, etc.), and the future ability of the industry to attract and retain a capable labor base.

4.1 SHIPYARD CAPACITY, CAPABILITY, AND WORKLOAD

Appendix A provides a list of ships under contract at each of the shipyards, and is summarized in the Table below. Current shipyard product lines, capacity, workload, and employment are detailed in Appendix B. Appendix B contains company proprietary (FOIA exemption 4) and Government deliberative information (FOIA exemption 5), and is therefore not discussed here.

Figure 4.4: Current Shipyard Product Lines

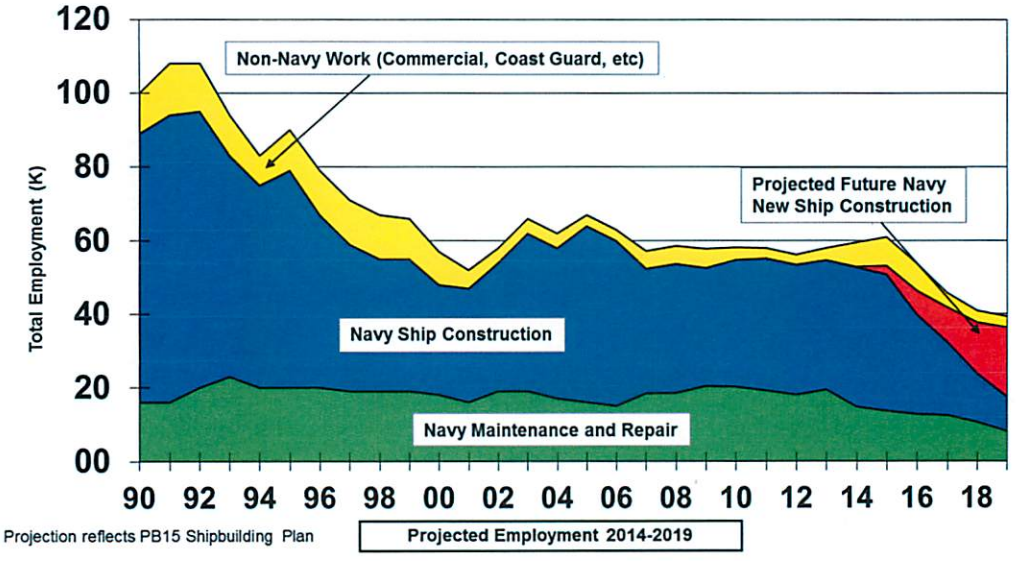
Shipyard	Product Lines
HII NNS	• Submarines (SSNs, OR) • Aircraft Carriers (CVNs) • CVN Refueling Overhauls • In-service SSN and CVN availabilities
HII Ingalls	• Small and Large Deck Amphibs (LHA(R), LPDs, LSDs) • Destroyers (DDGs) • Auxiliaries • USCG National Security Cutter
GD EB	• Submarines (SSNs, OR) • In-service SSN availabilities
GD BIW	• Destroyers (DDGs)
GD NASSCO	• Amphibs and Auxiliaries • Mobile Landing Platform / Afloat Forward Staging Base • In-service availabilities • Commercial work, including 8 tankers and 2 container ships
MMC	• Littoral Combat Ship (FREEDOM variant) • Coast Guard Response Boats (Medium)
Austal	• Littoral Combat Ship (INDEPENDENCE variant) • Joint High Speed Vessels

Note: HII Ingalls has prior auxiliary shipbuilding experience, and GD NASSCO's in-service availability work includes amphibious ships.

Shipbuilding procurement stability is important for industrial base predictability and preservation. The Long Range Shipbuilding Plan considers the production of ships in order to sustain the industrial base, promote competition where possible, and most importantly meet force structure requirements. Construction of aircraft carriers and large deck amphibious ships are set on five and four year centers, respectively. Large surface combatants are procured at least two per year to ensure source of supply. Submarine construction is also set at two per year to ensure two sources of supply. Small surface combatants are also procured in quantities to ensure competition. Amphibious and auxiliary construction has been set to minimum levels. The addition of LPD 28 and Mobile Landing Platforms (MLP) 4 and MLP 5 have greatly contributed to the foundation for the recently announced overarching acquisition strategy to stabilize this sector of the shipbuilding industrial base.

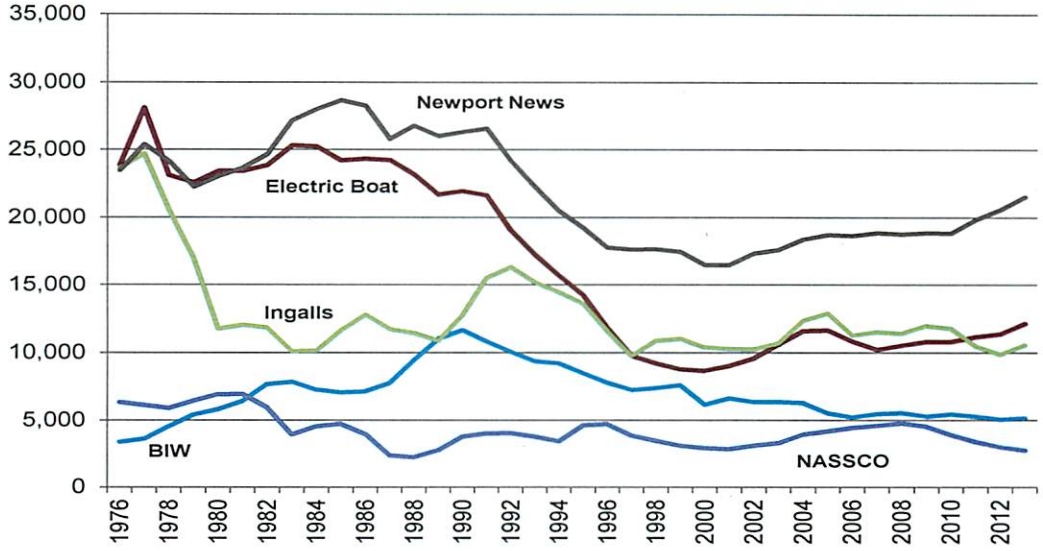
Not only is the physical capability and capacity of a shipyard important, but employment is also a key factor. Private-sector shipyard employment decreased throughout the 1990s, stabilized during the last decade, and is poised to decrease further. These "peaks and valleys" complicate hiring, training, and capital investment strategies, particularly in terms of retaining critical skills. Figure 4.5 depicts private-sector total shipyard employment levels at HII NNS, HII Ingalls, GD EB, GD BIW, GD NASSCO, MMC, Austal, and HII Avondale since 1990, with projections for 2014-2019 based on the Navy's PB 2015 shipbuilding acquisition profile.

Figure 4.5: Private Sector Total Shipyard Employment



Over the years, a number of shipyards have exited from naval ship construction or the entire shipbuilding industry. Most recently, in October 2014, the HII Avondale shipyard in LA, shipped its last LPD units to Pascagoula, MS, and shuttered the facility. Figure 4.6 provides a summary of shipyard total employment (direct and indirect) with the exception of Austal and MMC. Further details regarding shipbuilding employment are provided in Appendix B, which contains company proprietary (FOIA exemption 4) and government deliberative information (FOIA exemption 5).

Figure 4.6: HI NNS, GD EB, HII Ingalls, GD BIW, and GD NASSCO Shipyard Total Employment



Shipyard employment (direct and indirect workers) rounded to the nearest 100 as of November/December 2014 is provided in Figure 4.7.

Figure 4.7: Shipyard Employment

Shipyard	Employees (Direct and Indirect)
HII NNS	22,500
HII Ingalls	11,300
GD EB	12,700
GD BIW	5,400
GD NASSCO	3,200
MMC	1,400
Austal	4,300

4.2 SHIPYARD HISTORICAL INVESTMENT IN MODERNIZATION AND WORKFORCE

4.2.1 Production Facility Modernization Initiatives

Production facility modernization investments are critical to sustaining the shipbuilding industrial base's efficiency and effectiveness. Each of the seven shipyards has made investments to modernize their production facilities. Since 2005, the shipyards have invested over $2.5 billion in production facilities.

In conjunction with the shipyards, the Navy has supported numerous capital investments. These investments include such modernizations as modular construction and assembly facilities; information technology and software upgrades; production line expansions; facility and dock upgrades; blast, paint, welding, and machinery shop upgrades and refurbishments; improved material transportation and storage; new ultra hall facilities; structural fabrication facility equipment/systems upgrades; pier and crane upgrades; new/improved outfit halls; learning and training centers; new cut/panel fabrication buildings; and additional land procurement.

As a result of these investments, the shipyards and the Navy have benefited in numerous ways, including:

- improved production efficiency and capacity;
- reduced costs;
- improved quality;
- sustained and improved operations, performance, and schedule;
- improved safety;
- improved production flow;
- improved engineering drawings and system functionality;
- improved facility utilization; and
- sustained operational capacity.

Challenges to retaining and leveraging the value of these initiatives include long-term workload stability and securing future work; regulatory and environmental requirements; timing of return on investments; and recruiting, training and retaining a skilled workforce. Continuity of these production facility investments will be important to maintaining shipbuilding capacity and capability and improved process efficiencies to reduce shipbuilding costs. Appendix C provides a detailed description of investments by each shipyard and the Navy from 2005-2014, including a summary of the projected benefits for the shipyards and Navy, and any challenges to continuing the initiatives, as applicable/available. Appendix C contains company proprietary (FOIA exemption 4) information. Additional information regarding shipyard production facility modernization initiatives are discussed in the FMI report.

4.2.2 Workforce Recruitment, Training, and Retention Investments

The shipyards together have made numerous investments of over $1.4 billion since 2005 in support of workforce recruitment, training, and retention. State and local governments have also invested in this area. Hiring was enhanced through various job fairs, outreach activities, conferences, and online advertisements and recruitment incentives. Training investments were made to increase the availability and skills of various trade workers and professional employees, including additional classrooms; additional courses; apprentice schools; partnerships with colleges and universities; training academies; on-the-job/hands-on training; and environmental, safety, and occupational health training. Additional management training and development, mentoring, surveys, tuition reimbursement, bonuses, and career-advancement opportunities were pursued for training and workforce retention. Preserving critical engineering skills; leadership development; and capturing skilled, senior workforce knowledge are vital.

As a result of these investments, shipyards are able to recruit an experienced workforce, improve employee skills, provide higher quality workers to meet shipyard demands to construct ships more efficiently and safely, have greater training throughput, expand training capacity, and retain employees by enabling career advancement. All of these investments directly support the safety, quality, cost, and schedule of Navy programs.

Maintaining shipbuilding stability, robust workload demand, and avoiding workload valleys were noted as major challenges to these investments. The competitive nature of the labor economy and a reduced interest in heavy manufacturing positions have driven the demand for skilled workers to be greater than the supply Furthermore, workforce availability at many sites is susceptible to natural disasters such as the hurricane that affected Gulf Coast housing in 2005. All of these factors create recruitment and retention challenges for some shipbuilders in some regions.

Appendix D provides a detailed description of each of the workforce recruitment, training, and retention investments from 2005-2014. This includes a summary of the projected benefits for the shipyard and Navy, and any challenges to continuing the initiatives, as applicable/available. Appendix D contains company proprietary (FOIA exemption 4) information. Additional information regarding workforce skills, qualifications, and experience is in the FMI report.

4.3 POTENTIAL SHIPYARD INVESTMENTS

Shipyards estimate that over $1.6 billion could be spent toward investments to achieve Navy program cost reductions and/or position the shipyards to survive a number of years on reduced Navy orders. These investments could include process analysis, tools and equipment modernization, improved engineering and planning software and process integration, production automation, upgrades to existing panel lines, new block

fabrication, and integration halls, new/replaced drydock and cranes, new blast and painting buildings, improved transports, software upgrades, improved welding facilities, improved three-dimensional (3D) imaging and mapping, and additional warehouse/storage facilities.

These investments would increase production efficiency and improve capability, quality, and capacity/throughput, reducing labor hours in support of affordability via reduced overall cost. Such investments would also improve work-site utilization, automation, regulatory compliance, and assist with improved standard process integration and optimization. A detailed description of these potential shipyard investments and the projected benefits is provided in Appendix E, which contains company proprietary (FOIA exemption 4) information.

FMI also noted investment resource opportunities for improvement at some of the shipyards in numerous areas, including: design for production, dimensional and quality control, manpower and organization of work, process engineering, inventory and logistics, module building, pre-erection outfitting, and outfit installation. FMI recommends further infrastructure investment, particularly in high investment areas such as construction points and block assembly buildings but also in some lower cost areas. Further information on potential investments is outlined in the FMI report.

Additionally, investments targeted at improving efficiencies at the shipyards' prime equipment suppliers to achieve program cost reductions are being considered. These discussions are preliminary and are anticipated to target specifically identified gaps or needs, such as any possible associated contractual incentives.

Consistent with the Under Secretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)'s Better Buying Power (BBP) 3.0 initiative, the Department will continue to investigate opportunities to incentivize productivity and innovation in industry and government through profitability alignment, incentive-type contracting, expanding the Superior Supplier Incentive Program, removing barriers to commercial technology utilization, increasing the use of prototyping and experimentation, and increasing the return on Small Business Innovation Research.

4.4 SHIPYARD CONSTRUCTION PROCESSES AND METHODS

During 2014, the Navy sponsored an update of the previous shipbuilding benchmarking studies performed for the Office of the Secretary of Defense by FMI almost a decade ago. At each of the shipbuilders, FMI conducted a new benchmarking survey, identified technology gaps, and suggested a prioritized listing of areas for targeted performance improvement and gap closure actions. The FMI shipbuilding benchmarking system allows the processes and practices applied in individual shipyards to be compared to other yards and to international best practice. The overall objective is to identify

actionable items to improve the performance of U.S. naval shipbuilding and ship repair enterprises. New to the U.S. project is the addition of a customer-factor segment derived from interviews and discussions, which will investigate the influence of Navy and government behaviors, requirements and capabilities on shipyard productivity.

While the FMI benchmarking project is still ongoing and will not be completed at the repair shipyards until later in 2015, the new construction shipbuilding site visits and benchmarking analyses were completed during 2014. An overall summary report of the 2014 benchmarking results will be released in early 2015 and will show the ranges of benchmarking scores found across the shipyards. Although individual shipyard data will be protected, the report will enable the reader to compare the 2014 benchmarking score ranges and averages with the earlier U.S. benchmarking studies and international scores. Since shipyard construction processes and methods are discussed in detail in the FMI report, they are not discussed here within.

4.5 OPPORTUNITIES FOR COMPETITION BY SHIP CLASS

Competition necessitates innovative thinking and leads to performance improvements through the adoption of new technologies and the application of new business strategies. As highlighted in BBP 3.0, a continued shift in emphasis will be toward achieving dominant capabilities through innovation and technical excellence. USD(AT&L) further notes the importance of promoting effective competition by "creating and maintaining competitive environments." In the absence of direct competition, anything that creates a "competitive environment" has value to the Department. Competition is a critical driver of performance and innovation, and enables affordability and cost control, and has had a positive influence on productivity. Competition in shipbuilding at the prime contractor, subcontractor/supplier, and/or government furnished equipment (GFE) level produces both technological and cost benefits to the Navy. As such, a cornerstone of Navy acquisition strategies is to utilize aspects of competition at all levels of procurement. Figure 4.8 depicts the prospects, by ship type, for using competition in the design and construction of Navy ships.

Figure 4.8: Competition in the Design and Construction of Navy Ships

		FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
Aircraft Carriers	CVN				1					1	
Submarines	VA Class	2	2	2	2	2	2	1	2	2	1
	OR							1			1
Surface Combatants	DDG 51	2	2	2	2	2	2	2	2	2	2
	LCS	3	1/2	3	3	2	3	3	3	3	3
Amphibious Warfare Ships / Combat Logistics Force	LHA(R)			1							1
	TAO(X)		1		1	1	1	1	1	1	1
	LPD 17		1								
	LX(R)						1		1	1	1
Command & Support Vessels	JHSV	1									
	MLP AFSB			1							
	T-ATF(X)			1	1	2					
	T-ARS(X)						1		1	1	1
	T-AGOS(X)							1	1	1	1
	AS(X)									1	

Sole Source, with competition as feasible
Team Agreement, with competition/incentives as feasible
Competition - Dual Yard Award
Competition
Acquisition Strategy is being defined

Black Text reflects ships on contract. Red text reflects future procurements.

4.5.1 Aircraft Carriers

The third FORD Class carrier, USS ENTERPRISE (CVN 80), will be procured in FY 2018. CVN 80 will be a sole-source procurement built by HII NNS. CVN 81 will be procured in FY 2023. It is anticipated CVN 81 will be constructed via sole-source procurement with HII NNS as well. HII NNS is the only source that can satisfy current Navy CVN requirements as the design and construction of a nuclear-powered aircraft carrier requires highly technical and specialized knowledge of the ship's mission, design, systems, and nuclear reactor plants. HII NNS has developed a unique capability encompassing all aspects of aircraft carrier design, construction, modernization, repair, and technical and engineering support. Additionally, HII NNS is the only shipbuilder with adequate facilities to accommodate construction of a large deck carrier. Despite the lack of prime contractor competition, the CVN program office team is working with HII NNS to select the most cost-effective sources through competition where practicable at the subcontract level. This includes contract incentives to promote design, construction improvements, and productivity improvements, along with life-cycle cost reductions. Procurement, installation, and testing of GFE will be competitively solicited, where possible and appropriate.

4.5.2 Submarines

Procurement plans for submarines equals two submarines per year through FY 2024, balanced between attack and ballistic missile submarines. This provides steady, predictable workload. VIRGINIA Class attack submarines are built under a team agreement between prime contractor GD EB and subcontractor HII NNS. Such a team agreement: (1) fits with each company's independent objective of maintaining its technological skills, operational capacity, facilities and other strengths in the construction

and design of submarines; and (2) offers the government the best combination of performance, cost, and delivery.

The Block IV Request for Proposal (RFP) was structured to leverage the best potential 10 boat scenario pricing by requiring the shipyards to propose both a five/five and a six/four delivery yard allocation, and the awarded contract included a six/four workshare allocation (six to GD EB and four to HII NNS). A "win-back" provision was included in the subcontract to allow HII NNS to deliver a fifth boat based on certain improved performance criteria subject to Navy approval. It is anticipated that Block V will be procured in FY 2019+, and that acquisition strategy is being refined.

The OR ballistic missile submarine is a future submarine designed to replace the Trident missile-armed Ohio Class ballistic missile submarines. GD EB will begin detail design for OR submarines starting in FY 2017 and the lead boat in the class will be procured in FY 2021. The second boat will be procured in FY 2024. The Navy has commissioned a study of the long-term submarine construction enterprise in support of OR construction to evaluate joint OR and VIRGINIA Class construction best-value options. GD EB and HII NNS are providing input on the plan in order to offer the best value for the Navy and consider long-term industrial base capability and health. The outcome of this study will influence the future of both the OR and VIRGINIA Class programs, though some combination of limited source, EOQ, MYP and/or block buy in line with the existing team agreement is likely.

4.5.3 Surface Combatants

A minimum of two large surface combatants per year are included in the Navy's plan through FY 2024. This ensures two sources of supply are available for large surface combatants. An existing MYP covers FY 2013 – FY 2017 DDG 51 Class destroyer requirements, and HII Ingalls and GD BIW share the available workload. A competitive allocation strategy known as profit related to offers (PRO) was employed, which uses fixed-price incentive-contracts to ensure reasonable prices while maintaining the industrial base. This contract injected competition and maintained sufficient workload at two different shipbuilders.

The Navy will continue to build the Flight IIA version of the DDG 51 Class through one of the two FY 2016 ships. The Navy intends to shift production to Flight III beginning with the other FY 2016 ship. It is anticipated that DDG 51s will continue to be built at a steady rate of two per year thereafter, utilizing the same MYP strategy that employs dual shipbuilders who have competed using the PRO contracting mechanism.

Small surface combatants are projected to be procured in quantities that will support competition. The FY 2015 Littoral Combat Ship (LCS) and the first of the three FY 2016 LCS will be procured under the existing dual, fixed-price incentive, block-buy contracts,

which were awarded competitively in December 2010. The first of the three FY 2016 LCSs were originally planned for FY 2015, but due to fiscal constraints under the Bipartisan Budget Act (BBA), the Navy was compelled to shift the procurement to FY 2016. The prime contractors for these FY 2015 and FY 2016 requirements are Austal and Lockheed Martin, with MMC as the shipbuilder. The dual award block buy yielded competitive pricing that enabled the Navy to acquire more ships with the funding appropriated. This ensured stabilization of the LCS program and its supporting industrial base, sustained competition throughout the program's execution, and allowed the Navy to take advantage of the unique capabilities offered with two designs and two shipbuilders.

The FY 2016 – FY 2018 acquisition strategy is being refined, with FY 2018 reaching 32 ships. As recently directed by the Secretary of Defense, the Navy will pursue a modified LCS for the remaining ships. For requirements in FY 2019 and beyond, Navy anticipates that procurement of the remaining ships will involve some degree of competition, although the specifics of the acquisition strategy are still in development.

4.5.4 Amphibious Warfare Ships and Combat Logistics Force

The Navy will procure the first LHA(R) Flight I amphibious assault ship, LHA 8, in FY 2017, and the second in FY 2024. The Navy plans to procure the first T-AO(X) in FY 2016 with serial production beginning in FY 2018. LX(R), the replacement for the LSD 41 and LSD 49 Class dock landing ships will start in FY 2020, and continue with one ship per year beginning in FY 2022. LPD 28, MLP 4, and MLP 5 have or will provide workload to the shipyards that will benefit the aforementioned competition.

The Amphibious and Auxiliary Ships industrial base is of considerable concern to the Navy, and is viewed by the Navy to be the most at risk should future funding levels be reduced. The Navy has consistently stated its intention to compete all three above-mentioned ship classes. As such, the Navy has developed an overarching acquisition strategy to stabilize this sector of the shipbuilding industrial base. Competition is a key tenet within this strategy. The acquisition strategy will stabilize the workload in this sector during previously anticipated lower shipyard workloads in approximately FY 2016 through FY 2024.

4.5.5 Command and Support Vessels

The fifth MLP will be procured in FY 2017, and will be the third built as an Afloat Forward Staging Base (AFSB). The Navy sought competition for the system design and detail design and construction of MLP 1 - MLP 3, and awarded the contract to GD NASSCO after receiving only one qualified proposal. Following the decision for MLP 3 to become an AFSB variant, its contract design and construction were procured on a sole-source basis from NASSCO, as was MLP 4. GD NASSCO is the only source that has the

extensive knowledge and familiarity of the requirements, design, and construction of the MLP to efficiently and effectively produce an MLP AFSB.

T-ATF(X) is a recapitalization project to replace the capabilities provided by the four T-ATF 166 Class fleet ocean tugs, which reach the end of their expected service lives starting in 2020. An acquisition strategy has not yet been approved for the project. There are commercial ship designs that perform similar operations as the capabilities desired. Therefore, adequate competition is anticipated from shipyards who have built these vessels for commercial owners/operators as well as other shipyards which may compete for workload-leveling purposes.

T-ARS(X) is a recapitalization project to replace the capabilities provided by the four T-ARS 50 Class rescue/salvage ships, which reach the end of their expected service lives starting in 2025. As noted in the Long Range Shipbuilding Plan, the Navy is considering a common hull to replace both the T-ATF and T-ARS; acquisition of a common hull would follow the acquisition approach described for the T-ATF(X) and would preclude the need to acquire a separate T-ARS(X) Class. A decision on the common hull has not yet been made and, therefore, an acquisition strategy has not yet been developed for the project.

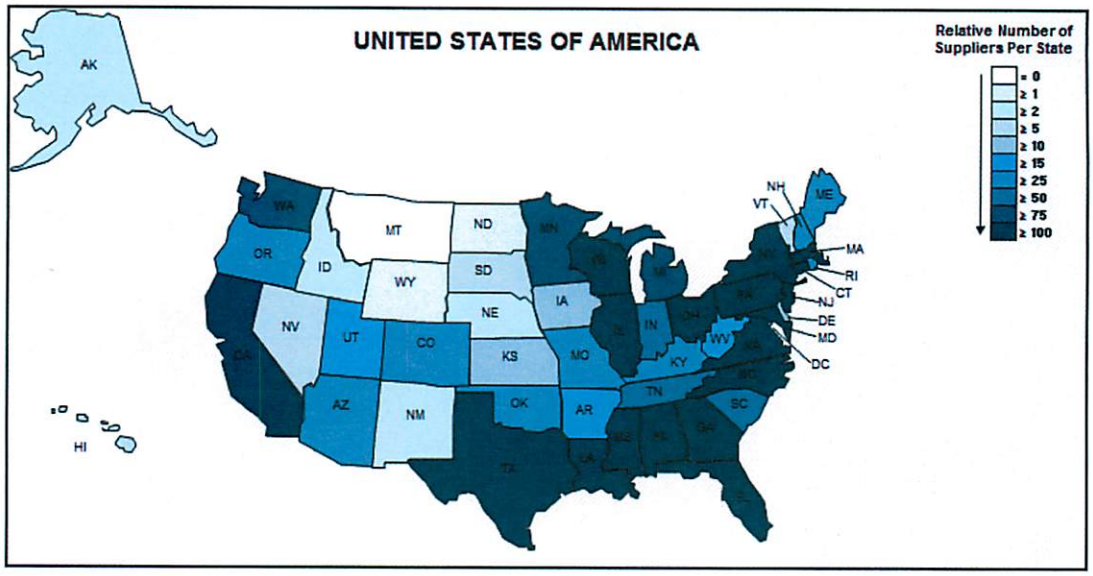
T-AGOS(X) is a recapitalization project to replace the capabilities provided by the four T-AGOS 19 Class and one T-AGOS 23 Class ocean surveillance ships, which reach the end of their expected service lives starting in 2021. An acquisition strategy has not yet been approved for the project. However, there are several shipyards capable of building T-AGOS(X) size vessels, and the Navy anticipates there will be adequate interest among the shipbuilders to conduct a competition for the Detail Design and Construction of the class.

The AS(X) project plans to replace the capabilities provided by the two AS submarine tenders, which were built 30 years ago and are expected to reach the end of their expected service lives in 2029 and 2030, respectively. An acquisition strategy has not yet been approved for the project. Adequate competition is anticipated from shipyards that have the capability to build these vessels.

4.6 SUPPLIER CAPACITY, CAPABILITY AND CHALLENGES

The U.S. naval shipbuilding industrial base is a complex, multi-tiered network of equipment, system and component suppliers. Due to the unique characteristics of U.S. Navy shipbuilding programs, constantly advancing technology, and various economic factors, the number and type of suppliers supporting our Navy is ever-changing. As illustrated by the Navy's supplier map, Figure 4.9, the industrial base spans the nation with companies of all sizes, from small businesses to large corporations, playing a significant role in local economies.

Figure 4.9: Shipbuilding Supplier Count



Due to its size and complexity, it would not be feasible or productive to assess the capacity and capabilities of the supplier base in its entirety. Some suppliers will enter and exit the shipbuilding industrial base as supply and demand for products change. However, there are single-/sole-source suppliers of critical shipbuilding/manufacturing components that are assessed and monitored to ensure the necessary industrial capabilities are preserved. Many of these suppliers have been identified, some of which have already participated in targeted surveys designed to collect information on present and future employment levels, facility capacity, plant utilization, diversification of annual sales, and average product lead times.

Because many key suppliers are dependent on the DoD for revenue, and product lead time can extend across many months, DoD budget volatility can lead to production breaks, supplier inefficiency, and lay-offs. Suppliers cite difficulty planning future work and unexploited savings opportunity as major concerns. These difficulties in formulating accurate plans for future work result in an inability to arrive at long-term purchasing agreements with vendors, which can lead to higher material prices.

This affects Navy ship prices and contributing to deterioration in Navy buying power. With less buying power, the Navy buys fewer ships, leading to reduced business for the shipbuilding supplier base. In order to preserve key industrial base capabilities, this cycle should be broken. The Navy has already engaged in initiatives such as advanced procurement, MYP, and material commonality, to provide stability and mitigate volatility at the supplier level. In addition, the DoD and the Navy have programs in place to address supplier issues, including programs to improve productivity, efficiency, and

competitiveness. The Navy continues to work closely with prime contractors to ensure key suppliers are identified and effective action is taken to reduce costs.

4.7 SHIPBUILDING RESEARCH AND DEVELOPMENT INVESTMENTS

In addition to the shipyard production facility modernization investments discussed in Section 4.2.1, since 2010, over $270 million has been spent toward R&D investments by industry, the NSRP, the Navy's Mantech, and the Center for Naval Shipbuilding Technology (CNST) in support of shipyard-related R&D investments. NSRP has been the cornerstone for industry performance improvement efforts for a number of years. The program has provided necessary research and a unique forum for discussion, and will continue to play an important part in facilitating improvements in industry.

Investments include flexible infrastructure, advanced materials and methodologies, advanced coatings, advanced weapons and sensors, and augmented reality technologies; 3D additive manufacturing technologies; electrical power and advanced integrated power systems; laser processing, scanning and imaging technology; hull, mechanical, and welding process improvements; advanced computing; advanced modeling and simulation; improved process and tool development; robotics and improved automation; and corrosion control.

One specific project example is the light-emitting diode (LED) lighting. The new prototype expects to bring 35 percent lower cost and 45 percent less weight than traditional fluorescents. Another example is compatibility of "single coat" tank coatings with retention of pre-construction primer. The single coat systems show 10-30 percent cost savings over legacy methods and the retention of pre-construction primer could save new construction costs. Furthermore, an improved advanced watertight door is also being implemented which will help reduce shipboard weight, reduce maintenance costs, and increase reliability.

These investments will continue to provide improved production and process efficiencies, improved performance, risk reduction, improved quality, advanced capability, reduced labor costs, and lower life-cycle costs. Additional support and implementation of the successful projects will be critical to support DoD and DoN strategic objectives. Capital investment considerations and return on investment, as well as demand and interest, impact their widespread usage and implementation. The DoD and DoN plan to continue support of such investments in order to maintain technological superiority.

4.8 BUDGET CONSIDERATIONS AND RISK TO THE INDUSTRIAL BASE

The FY 2016 Presidential Budget submission is governed by the 2014 Quadrennial Defense Review (QDR) which implements the 2012 Defense Strategic Guidance (DSG) (albeit with higher risk), and continues our efforts to ensure our ability to fight and win

the nation's wars, operate forward, and sustain readiness. Although forestalled somewhat by sequestration in FY 2013 and the BBA in FY 2014 and 2015, the principal risk to the Department's ability to meet the DSG remains the considerable uncertainty in future funding. This uncertainty hinders planning and impedes balancing near- and long-term readiness and capability.

In working to mitigate this challenge, the Navy has set priorities in the shipbuilding, aviation, weapons, and combat vehicle plans, and has worked aggressively within the DoN to reduce and control the costs of acquisition programs. In all these efforts, the principal requirement remains to equip the Navy and Marine Corps with the most effective warfare systems - through procurement, modernization, and sustainment - to address the security challenges of today and tomorrow.

However, the potential for a return to sequestration-level funding in FY 2016 and future years increases the Department's risk in meeting the current and future requirements necessary to meet the Navy's missions. The 2013 sequestration was manageable in part because of key budget reprogramming actions made by the Department, with Congressional support. The Department was able to execute its plans for procurement of the ships appropriated for FY 2013, and in particular was able to award the FY 2013 – FY 2017 MYP of DDG 51 Class destroyers. In order to accomplish this, however, the Department applied mitigating actions to ships in execution and deferred costs to future years in order to avoid breaking programs.

Congress' passage of the BBA, which raised discretionary funding caps above the sequestration level for FY 2014 and FY 2015, allowed the Navy to avoid indiscriminate funding reductions across all programs. However, while the BBA provided some relief in FY 2014 and FY 2015, the lower funding levels compared to the FY 2014 Presidential Budget compelled the DoN to make tough choices and accept higher risk in the Navy's ability to meet the DSG. Today, the Navy is trying to manage the reduced funding levels by improving efficiencies, reducing costs, and providing stability where possible.

As cuts to DoN shipbuilding programs are the least reversible in their impact on the DoN's fundamental mission of providing presence and in their consequences to the industrial base and to our economy, the Department is committed to the maximum extent possible, to preserve ship construction and to seek reductions in every other area first, should budget reductions such as sequestration become reality. If sequestration returns in FY 2016, a revisit and revision of the defense strategy would be necessary. With limited ability to mitigate the impacts as we did in FY 2013, sequestration in FY 2016 would force the Department to further delay critical warfighting capabilities, reduce readiness of forces needed for contingency response, further downsize weapons capacity, and forego or stretch force structure procurements as a last resort.

Beyond the FYDP, the need to recapitalize the Fleet Ballistic Missile Submarine force will cause significant and noteworthy risks to the Navy's overall shipbuilding plan, beyond those that will result from sequestration. The OR program is the Navy's highest shipbuilding priority. As a cornerstone of the country's strategic deterrence triad, there is a strict requirement to replace the Ohio Class submarines on a one-for-one basis as these submarines are retired. If additional funding is not available to support the shipbuilding procurement plan during this replacement period, there will be significant, detrimental impacts on the remaining shipbuilding programs. If the DoN is unable to sustain the average annual shipbuilding budgets of $19.7 billion over the course of the next decade, the battle force will fall far short of meeting QDR requirements.

Funding stability is critical for stability in the Navy's shipbuilding program and industrial base. A shortage of funding would reverse the Navy's progress towards recapitalizing a 300 ship battleforce and would increase the pressure on the shipbuilding industry. The Department will continue to work closely with Congress to maintain the right balance across capacity, capability, readiness, and the industrial base.

4.9 HISTORICAL AND FUTURE SHIPBUILDING FUNDING

Appendix F provides an itemized listing of funds budgeted for support of the shipbuilding industrial base from FY 2006 to FY 2019. The list includes funding for major naval shipbuilding programs outlined in section 3.1, related Office of Naval Research science and technology efforts, the Maritime Administration assistance to small shipyard program and guaranteed loan program, and the U.S. Coast Guard. The Naval shipbuilding program funding is based on the PB 2015 request, PB 2015 Selected Acquisition Reports, and other historical funding data.

5.0 CONCLUSION

The interconnectivity of today's shipbuilding industry with its supplier and vendors is complex, and disruptions to the Navy's shipbuilding plan results in a cascading effect, with near- and long-term implications. A healthy design and production industrial base is critical to achieving DoN priorities and fulfilling Navy needs. Prime equipment suppliers are critical foundational components of the success and sustainment of the Navy's and the shipyard industrial base. The DoN must provide stability and predictability to the industrial base to maintain the ability to continue building the future Fleet as outlined in the Long Range Shipbuilding Plan.

Shipyard production facility, workforce, and research and development investments have provided significant benefits for the shipbuilder and the Navy. These investments support affordability, minimize life-cycle costs, emphasize technology insertion, improve and ensure quality products, facilitate effective and efficient processes, and promote competition -- which all support DoD and DoN priorities.

Shipbuilding and industrial base stability requires continued close cooperation among the Navy, Congress, and industry. It will continue to be essential to balance capability, affordability, and a robust industrial base. Numerous investments have been made by all of the shipyards to maintain critical shipbuilding capacity and capability, and to improve shipbuilding facilities and process efficiencies in order to reduce shipbuilding costs. Along with the past, current, and possible future production facility and R&D investments outlined in this report, workforce recruitment, and training and retention investments will continue to be needed.

Funding stability is fundamental to shipbuilding program and industrial base stability. Because cuts to DoN shipbuilding programs are the least reversible in their impact on the DoN's fundamental mission of providing presence and in their consequences to the industrial base and to our economy, the Department is committed to the maximum extent possible, to preserve ship construction and to seek reductions in every other area first, should budget reductions such as sequestration become reality. A shortage of funding would reverse the Navy's progress towards recapitalizing the Navy's battleforce and would increase the pressure on the shipbuilding industry.

The DoN will continue to engage and work closely with the shipbuilders regarding capacities, capabilities, and key challenges they face. As the Navy's workload projections illustrate, each shipyard will face challenges as their current workload completes. Given the priority and necessity for replacing the OR submarines, the two nuclear shipbuilders and their suppliers have a firm basis for production and non-production workload through the early 2030s. In contrast, the non-nuclear shipbuilders and suppliers' risk may be greater during this same timeframe, depending upon the funding levels enacted. Less funding would lead to lower capacity and under-utilization, further impacting shipbuilding affordability for the Department, as well as the industrial base's ability to compete for additional work and make necessary investments in facilities, people, and processes. In addition, discussions with shipyards are being pursued to evaluate possible investments to improve prime equipment supplier production, in order to further reduce costs and improve efficiencies. DoN has and will continue to emphasize stability; competition; maximizing our buying power through EOQs, block buys and MYP; and driving affordability earlier and throughout the life cycle of each ship.

DoN will continue to work with Congress and industry to evaluate opportunities for continued acquisition efficiency and cost-savings opportunities. This includes flexibility with the use of advanced procurement funding for long-lead time and materials as well as continued use of block buys and MYP in order to enable more efficient and effective shipbuilding and construction schedules.

APPENDIX A: SHIPS UNDER CONTRACT AS OF JAN 2015

Shipyard	Hull	Name
HII-NNS	CVN 78	GERALD R. FORD
HII-NNS	SSN 785	JOHN WARNER
HII-NNS	SSN 787	WASHINGTON
HII-NNS	SSN 789	INDIANA
HII-NNS	SSN 791	DELAWARE
HII-NNS	SSN 794	MONTANA
HII-NNS	SSN 796	TBD
HII-NNS	SSN 798	TBD
HII-NNS	SSN 800	TBD
HII-INGALLS	DDG 113	JOHN FINN
HII-INGALLS	DDG 114	RALPH JOHNSON
HII-INGALLS	DDG 117	PAUL IGNATIUS
HII-INGALLS	DDG 119	TBD
HII-INGALLS	DDG 121	TBD
HII-INGALLS	DDG 123	TBD
HII-INGALLS	DDG 125	TBD
HII-INGALLS	LHA 7	TRIPOLI
HII-INGALLS	LPD 26	JOHN P. MURTHA
HII-INGALLS	LPD 27	PORTLAND
GD-EB	SSN 786	ILLINOIS
GD-EB	SSN 788	COLORADO
GD-EB	SSN 790	SOUTH DAKOTA
GD-EB	SSN 792	VERMONT
GD-EB	SSN 793	OREGON
GD-EB	SSN 795	HYMAN G. RICKOVER
GD-EB	SSN 797	TBD
GD-EB	SSN 799	TBD
GD-EB	SSN 801	TBD
GD-BIW	DDG 115	RAFAEL PERALTA
GD-BIW	DDG 116	THOMAS HUDNER
GD-BIW	DDG 118	DANIEL INOUYE
GD-BIW	DDG 120	TBD
GD-BIW	DDG 122	TBD
GD-BIW	DDG 124	TBD
GD-BIW	DDG 126	TBD
GD-BIW	DDG 1000	ZUMWALT
GD-BIW	DDG 1001	MICHAEL MONSOOR

Shipyard	Hull	Name
GD-BIW	DDG 1002	LYNDON B. JOHNSON
GD-NASSCO	MLP 3	LEWIS B. PULLER
GD-NASSCO	MLP 4	TBD
MMC[1]	LCS 5	MILWAUKEE
MMC	LCS 7	DETROIT
MMC	LCS 9	LITTLE ROCK
MMC	LCS 11	SIOUX CITY
MMC	LCS 13	WICHITA
MMC	LCS 15	BILLINGS
MMC	LCS 17	INDIANAPOLIS
MMC	LCS 19	ST. LOUIS
MMC	LCS 21*	TBD
MMC	LCS 23*	TBD
AUSTAL	LCS 6	JACKSON
AUSTAL	LCS 8	MONTGOMERY
AUSTAL	LCS 10	GABRIELLE GIFFORDS
AUSTAL	LCS 12	OMAHA
AUSTAL	LCS 14	MANCHESTER
AUSTAL	LCS 16	TULSA
AUSTAL	LCS 18	CHARLESTON
AUSTAL	LCS 20	CINCINNATI
AUSTAL	LCS 22*	TBD
AUSTAL	LCS 24*	TBD
AUSTAL	JHSV 5	TRENTON
AUSTAL	JHSV 6	BRUNSWICK
AUSTAL	JHSV 7	CARSON CITY
AUSTAL	JHSV 8	YUMA
AUSTAL	JHSV 9	BISMARCK
AUSTAL	JHSV 10	BURLINGTON

[1]MMC part of Lockheed Martin led team for the construction of LCS.

*Under Block Buy contract, not yet funded

APPENDIX F: FUNDING IN SUPPORT OF SHIPBUILDING INDUSTRIAL BASE

Program Element	Description	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
S&T/ONR															
0101224N	SSBN Security	41.9	41.6	31.8	32.8	33.1	33.2	32.4	30.0	29.7	28.7				
0602114N	Sea Platform Power & Energy Systems	89.4	5.5	-	0.8	0.8	-	-	-	-	-	-	-	-	-
0602123N	Sea Platform Power & Energy Systems	5.9	5.1	7.9	13.5	13.0	2.4	5.7	-	-	-	-	-	-	-
0602123N	Sea Basing & High Speed Vessel Technolog	2	-	-	-	-	-	-	-	-	-	-	-	-	-
0602123N	Sea Platfrom Survivability	-	-	-	-	2.0	1.4	1.0	-	-	-	-	-	-	-
0602123N	Sea Platform Design & Performance	-	7.5	-	4.6	3.6	-	-	-	-	-	-	-	-	-
0602123N	Structural Naval Materials & Welding	0.5	-	2.1	0.8	-	-	-	-	-	-	-	-	-	-
0602123N	Corrosion Control and Coatings	-	2.9	-	-	-	-	-	-	-	-	-	-	-	-
0602131M	Sea Platform Power & Energy Systems	-	0.3	-		-	-	-	-	-	-	-	-	-	-
0602236N	Sea Platform Power & Energy Systems	-	0.3	0.9	-	-	0.6	-	-	-	-	-	-	-	-
0602236N	Sea Basing & High Speed Vessel Technolog	7.9	11.2	12.7	21.6	18.7	10.1	6.9	-	-	-	-	-	-	-
0602236N	Sea Platfrom Survivability	-	0	-	-	-	-	-	-	-	-	-	-	-	-
0602236N	Structural Naval Materials & Welding	6.2	2.1	1.4	4.5	1.6	-	-	-	-	-	-	-	-	-
0602236N	Corrosion Control and Coatings	-	-	0.8	3.8	2.8	3.1	7.6	2.7	-	-	-	-	-	-
0602271N	Sea Basing & High Speed Vessel Technolog	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
0602271N	Sea Platfrom Survivability	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
0602651M	Sea Platform Design & Performance	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-
0602747N	Sea Platform Power & Energy Systems	-	-	-	-	-	-	3.4	5.1	6.0	6.1	4.1	-	-	-
0602750N	Sea Platform Power & Energy Systems	-	-	-	-	-	-	-	2.6	2.8	10.3	9.2	5.4	4.3	2.4
0602750N	Sea Basing & High Speed Vessel Technolog	-	-	-	-	-	-	-	8.6	4.0	5.1	1.4	4.4	4.7	3.8
0602750N	Corrosion Control and Coatings	-	-	-	-	-	-	-	3.2	6.2	7.5	9.3	8.2	6.4	3.3
0603114N	Sea Platform Power & Energy Systems	6.2	4.2	3.8	2.0	1.6	-	-	-	-	-	-	-	-	-
0603114N	Sea Basing & High Speed Vessel Technolog	6.6	17.9	19.2	-	-	-	-	-	-	-	-	-	-	-
0603123N	Sea Platform Power & Energy Systems	48.6	23.8	21.6	15.3	21.9	7.9	6.7	-	-	-	-	-	-	-
0603123N	Sea Basing & High Speed Vessel Technolog	18.2	4.6	-	-	2.9	-	-	-	-	-	-	-	-	-
0603123N	Sea Platform Survivability	2.2	4.8	-	6.0	4.4	2.2	1.4	-	-	-	-	-	-	-
0603123N	Sea Platform Design & Performance	-	1.3	-	3.4	-	-	-	-	-	-	-	-	-	-
0603236N	Sea Platform Power & Energy Systems	-	2.8	0.8	5.6	1.0	-	0.1	-	-	-	-	-	-	-
0603236N	Sea Basing & High Speed Vessel Technolog	36.8	23.0	40.3	38.2	17.6	33.2	19.7	-	-	-	-	-	-	-
0603236N	Sea Platfrom Survivability	-	-	1.3		-	-	-	-	-	-	-	-	-	-
0603236N	Structural Naval Materials & Welding	1.0	1.0	-		-	-	-	-	-	-	-	-	-	-
0603236N	Corrosion Control and Coatings	2.2	-	1.9	3.0	3.0	3.0	4.7	-	-	-	-	-	-	-
0603673N	Sea Platform Power & Energy Systems	-	-	-	-	-	-	-	6.0	1.1	14.7	11.3	1.8	13.0	8.4
0603673N	Sea Basing & High Speed Vessel Technolog	-	-	-	-	-	-	-	12.6	12.6	4.2	3.4	4.5	5.2	4.9
0603673N	Sea Platfrom Survivability	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-
0603673N	Corrosion Control and Coatings	-	-	-	-	-	-	-	4.4	1.3	8.1	15.0	12.5	13.6	9.3

Program Element	Description	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
Shipbuilding															
0708011N	Industrial Preparedness	33.1	33.0	35.6	34.5	36.7	28.4	29.4	45.8	28.0	23.4	32.5	26.9	27.4	27.8
0604300N;	CG(X)														
0204201N		75.52	15	84.08	73.07	13.53									
0603512N;	CVN-78 / CVN-21	245.5	229.5	191.5	201.8	179.6	119.9	113.3	102.9	104.7	114.7	55.7	57.1	52.8	44.8
0603564N;	RDT&E														
0603570N;															
0604112N;															
0604567N;															
0204112N;	CVN-78 / CVN-21														
0204112N	SCN	618.9	782.7	2780.8	3683.5	1076	2254.7	554.8	475	1520.7	1811.6	2903.8	2147.9	2646.3	1864.5
0603512N;	EMALS														
0604112N	RDT&E	56.8	108.2	40.5	113.2	90.9	59.1	31	55.1	43	8.2	2.5	0	0	0
	EMALS														
0204112N	SCN	0	5.8	27.8	211.6	143.9	360.3	0	17	26	197.3	189.3	145.3	203	0
0603564N;															
0604303N;	DDG-51														
0604307N	RDT&E	113.4	69.2	37.4	8.7	16.8	42.5	48.8	62.1	86.8	138.5	178.4	146.7	142.2	129.8
0204222N;	DDG-51														
0204222N	SCN	508.6	289.1	94.9	331.2	2428.5	2595.8	1901	4504.3	2086.2	2941.1	3355.1	3381.7	3448.6	3443.4
0204202N;	DD X / DDG-1000	1040.6	755.8	516.5	431.2	503.8	348.8	249.8	120.8	187.9	202.5	129	7.2	0	0
0603513N;	RDT&E														
0604300N;															
0604366N;															
0604755N															
0204228N;	DD X / DDG-1000														
0204222N;	SCN														
0204202N;															
0204222N		706.2	2587.6	3159.8	1504.3	1378.5	247.1	512.6	677.5	265.8	499.3	292.6	208.8	7.3	46
0208058N;															
0603564N;	JHSV														
0604567N	RDT&E	6.5	14.1	18.4	11.5	8.2	3.5	4.0	1.8	1.0	0	0	0	0	0
0208058N;	JHSV														
0208058N	SCN	0	0	0	192.3	177.4	176.1	362.6	196.8	21.6	51.4	47.7	20.3	11.6	0
	LCS														
0603581N	RDT&E	384.5	573.1	200.9	197.4	260	99.8	146.9	168.8	168.2	88.7	109.1	33.4	33.9	34.9
0204230N;	LCS														
0204230N	SCN	500	0	0	1017	1028.8	1189	1719.3	1789.2	1861.2	1638.4	1670.6	1756.1	1710.1	329.8
0204230N;	LCS														
0204230N	OPN	0	0	0	0	0	0	20.4	30.8	73.8	45.8	69	74.8	77.9	87.5
0603564N;	LHA-6 / LHA(R) / LHA Flt 1														
0604567N	RDT&E	21.6	12.9	10.9	7.6	8.7	10	20.4	25.1	80.8	10.6	8.8	2.52	4.4	4.5
0204411N;	LHA-6 / LHA(R) / LHA Flt 1														
0204411N	SCN	350.1	1131.1	1365.8	191.8	169.5	937.6	1942	176.6	66.8	61.1	296.1	1591	2389.2	27.9

Program Element	Description	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
	LPD-17														
0604311N	RDT&E	8.5	4.8	0.3	0	4	0	0	0	0	0	0	0	0	0
0204411N;	LPD														
0204411N	SCN	3304	471.6	1603.1	1033.1	1234.1	60.5	1956.9	389.9	52.6	90.2	139.2	52.3	30.7	7.8
0603564N;															
0604311N;	LX(R)														
0604454N	RDT&E	0	0	0	0	0.2	0.5	6.4	1.5	15.4	36.9	56.901	32.824	12.813	9.806
AP in FY2019															
Post FYDP	LX(R)														
Procurement	SCN														174
	MLP AFSB														
0204411N	SCN									579.3			613		
0603561N;															
0603570N;	SSBN-X														
0603595N	RDT&E	0	0	65.8	144.3	470.4	609.3	1046.6	505.6	1056.2	1219.2	1417.6	1107.9	1111.2	685.8
	SSBN-X														
	SCN											13.2	777.8	791.8	2887.9
0603561N;	SSN-774	166.3	191.2	233.5	180.5	172.8	161.5	105.7	78.7	118.8	202.7	253	291.7	265.4	111.5
0603564N;	RDT&E														
0603570N;															
0604558N;															
0604567N;															
0604580N															
0204281N;	SSN-774														
0204281N	SCN	2579	2589.5	3177.3	3670.4	4044.5	5182.7	4748.1	4703	6526.6	6020.9	5548.1	5339.1	5603.2	6005.6
0204281N;	SSN 774														
0204281N	OPN	44.1	47	39.7	48	13.8	21.7	5.3	1.8	14.7	9.3	9	9.2	9.3	9.5
	T-AGOS														
0603564N	RDT&E							2.34							
SCN 5035 begin	T-ATF(X)														
17	SCN												211.85	106.65	109.07
	T-AKE														
0408042N	NDSF	396.7	531.3	803.4	998.7	967.1	31.2	18	0	0	0	0	0	0	0
	T-AO(X)														
0603564N.	NDSF RDT&E	0	0	0	0	0	4.5	12.9	25	11.1	0	0	0	0	0
0204441N															
beginning in															
FY16	T-AO(X) SCN										0	682.1	0	587.2	589
NDSF 0900: 3110															
thru FY14;	MLP														
0604567N	NDSF RDT&E	58.41	85.83	67.86	36.43	52.31	3.48	4.93	3.95	18.68	8.45	1.8	0.8	0.5	0
NDSF 0401:	MLP														
0408042N	NDSF Proc					119.7	870	386	140.31	22.62	0				

Program Element	Description	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
USCG															
	Coastal Patrol Boat (CPB)	3.0	21.0	-	-	-	-	-	-	-	-	-	-	-	-
	Response Boat - Medium (RB-M)	12.8	17.3	31.5	76.0	84.0	29.3	77.0	5.3	7.0	-	-	-	-	-
	Cutter Boats (Small Boats SRP, LRI)	0.4	0.7	1.7	1.7	2.1	2.1	3.5	2.7	2.1	2.8	2.1	2.8	-	-
	National Security Cutter (NSC)	342.3	287.3	119.9	230.1	255.1	453.0	53.9	445.0	440.3	446.6	64.0	91.0	21.0	32.9
	Offshore Patrol Cutter (OPC)	7.0	-	-	2.1	6.9	31.4	17.5	20.0	16.1	14.0	13.0	70.0	371.0	301.0
	Fast Response Cutter (FRC-B)	-	105.0	-	80.7	165.2	153.6	240.1	223.1	217.0	77.0	238.0	154.0	154.0	220.5
	Polar Icebreaker Sustainment	-	-	-	21.2	19.1	0.0	-	5.3	1.4	4.2	2.8	70.0	14.0	70.0
	Response Boat - Small (RB-S)	-	-	-	-	-	9.4	5.7	8.2	9.8	7.0	7.0	7.7	7.7	-
Maritime Administration	Assistance to Small Shipyard (SSG) Program														
	SSG Grants	0	0	10.0	17.5	15.0	10.0	10.0	9.5	0.0	7*	7*	7*	7*	7*
	American Recovery and Reinvestment of 2009	0	0	0.0	100.0	0	0	0	0	0	0				
	Maritime Guaranteed Loan Program														
	Guarantee Subsidy	5.0	0	5.0	0	5.0	5.0	0	0	35.0	8.5	8.5*	8.5*	8.5*	8.5*
	Administration	4.1	4.1	3.4	3.5	4.0	4.0	3.7	3.5	6.5	3.1	0	0	0	0
	Transfer from DOD	0	0	0	48.0	29.9	40.0	0.0	0	0	0	0	0	0	0
	Rescission of FY 2009/2010 Unobligated	0	0	0	0	0	0	-35.0	0	0	0	0	0	0	0
	*Estimate based on previous 10 year average.														

REPORT TO CONGRESS

ON

SHIPBUILDING INDUSTRIAL BASE AND WORKLOAD ALLOCATION

PREPARED BY

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March 2015

The estimated cost of this report or study for the Department of Defense is approximately $4,100 for the 2015 Fiscal Year. This includes $20 in expenses and $4,080 in DoD labor.

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1. REPORT REQUIREMENTS

The Senate Report 113-211, accompanying H.R. 4870, the Department of Defense Appropriations Bill for Fiscal Year (FY) 2015, provides the following on pages 139-140:

Shipbuilding Industrial Base and Workload Allocation.—The Committee remains concerned generally about the overall health of the shipbuilding industrial base and specifically about the health of the non-nuclear surface combatant shipbuilding industry. The Committee reiterates its commitment to the goal of reducing costs and increasing value in the shipbuilding program and believes that cooperative workload allocation agreements between the DoN and industry may provide an alternative method to obtain efficiency and economies in DoN ship design and construction with the goals of closing the shortfalls in the fleet and retain the shipbuilding industrial base needed for future military requirements. Therefore, the Secretary of the DoN is directed to engage industry in discussions on future shipbuilding workload distribution and methods to ensure the viability of the non-nuclear shipyards over the long term.

For instance, when the LPD-17 program was experiencing significant production issues, the Department of the DoN entered into a workload agreement, ''Memorandum of Understanding Concerning the Reallocation of LPD-17 and DDG-51 Ship Construction Workload'' (SWAP 1), with shipbuilders on June 17, 2002. The purpose of the agreement was to reallocate workload to ensure ''stability at both yards, stabilize and reduce total projected shipbuilding costs for the LPD-17 Program, and maintain properly balanced sources of supply for future DoN surface combatant shipbuilding''. The agreement also requires the DoN to award a compensatory DDG-51 or equivalent workload if the DoN awards a shipbuilding contract for LPD-28. The Committee understands that the DoN considers this agreement to remain in full force and effect, and that the DoN will engage with shipbuilders involved in the agreement to discuss workload distribution. While Congress is not a party to this agreement, the Committee directs the DoN to submit a report to the congressional defense committees no later than March 1, 2015, on the DoN's options and potential courses of action to fulfill the requirements of the SWAP 1 agreement preceding or concurrent with when LPD-28 is placed under contract. The report should also address strategies to ensure the viability and stability of the non-nuclear shipyards over the long term to preserve the defense maritime industrial base and achieve the highest level of performance and quality from the shipbuilders.

2. NON-NUCLEAR SHIPBUILDING INDUSTRIAL BASE

The Navy's Shipbuilding Industrial Base Report to Congress and the Annual Long-Range Plan for Construction of Naval Vessels provides an overview of the state of the Navy's shipbuilding industrial base, including the non-nuclear surface combatant shipbuilding industry. The figure below outlines the new construction plan from Fiscal Year (FY) 2015 through FY 2025. The colored boxes reflect where the shipbuilder(s) is (are)

known. The white boxes reflect where the shipbuilder is not yet known and will be determined by a future competition.

New Construction Plan - PB 2016 Request												
		FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Aircraft Carriers	CVN				1					1		
Submarines	VA Class	2	2	2	2	2	2	1	2	2	1	2
	OR							1			1	
Surface Combatants	DDG 51	2	2	2	2	2	2	2	2	2	2	2
	LCS	3	1 2	3	3							
	FF					2	3	3	3	3	3	3
Amphibious Warfare Ships / Combat Logistics Force	LPD 17		1									
	LX(R)						1		1	1	1	1
	LHA(R)			1							1	
	TAO(X)		1		1	1	1	1	1	1	1	1
Command & Support Vessels	JHSV	1										
	MLP AFSB			1								
	T-ATF(X)			1	1	2						
	T-ARS(X)						1		1	1	1	
	T-AGOS(X)							1	1	1	1	
	AS(X)									1		1
TOTAL		8	9	10	10	9	10	9	11	13	12	10

Existing Contract - shipbuilders known
LHA 8 / T-AO(X) Combined RFP - limited competition, 2 shipbuilders known
Future Contract - shipbuilder(s) known
Procurement strategy is still being defined - shipbuilder unknown
Competition will be a key component, with Multiyear or Block Buy procurements to be used as feasible.

The Department of the Navy (DoN) continues to explore every opportunity possible to affordably procure our ships. All of our efforts focus on maintaining a viable shipbuilding industrial base while leveraging competition. We continue to engage and work closely with our shipbuilders regarding capacities, capabilities, and key challenges they face. The DoN believes continued use of multiyear (MYP) and block buy procurements provide the best means of ensuring stability and predictability within the industry with respect to workload and financial planning. The greatest risk to the industrial base is associated with budget uncertainty, particularly the disruption and inefficiency caused by sequestration, delayed authorization and appropriations, and the looming budgetary challenges.

Within the non-nuclear shipbuilding industrial base, the amphibious and auxiliary shipyards and their supply base constitute our greatest area of concern in the near term. While our DDG 51 destroyers and Littoral Combat Ships are covered under stable multiyear or block buy procurements, our amphibious and auxiliary ship procurements have not seen the same level of procurement stability. Given our concern with this portion of the shipbuilding industrial base, the DoN has been involving industry earlier in the acquisition process, contracting with them to perform design and affordability studies to better inform design trade-space, specifications and acquisition planning on the LHA 8, T-AO(X), and LX(R) programs. The DoN has seen the benefit of collaborative efforts to reduce the cost of the Virginia-class program, and is looking to adapt cost savings initiatives to the amphibious and auxiliary ship design and construction processes. These

efforts are essential to ensure that the amphibious and auxiliary ship construction plan is not placed further at risk due to affordability during the period of constructing the Ohio Replacement submarine.

In order to provide further stability to the amphibious and auxiliary ship industrial base, the DoN has developed a unique acquisition strategy which combines the LHA 8 and T-AO(X) detail design and construction efforts, and LX(R) contract design effort into a single limited competition. The DoN intends to compete the detail design and construction of LHA 8; the detail design and construction of the first six T-AO(X); and contract design support for LX(R) between Huntington Ingalls Industries (HII), Ingalls Shipbuilding (HII Ingalls) and General Dynamics, NASSCO (GD NASSCO). This competition will be limited to GD NASSCO and HII Ingalls since they are the only two sources with the capability to build both LHA 8 and T-AO(X) and the requisite knowledge of amphibious and auxiliary ship and systems design, engineering, and construction to efficiently and effectively construct the large deck amphibious and auxiliary ships within the required delivery period. Each shipyard will compete for both construction programs and one shipyard will be awarded LHA 8, and the other shipyard will be awarded the first six T-AO(X) ships. In addition, the bidder with the lowest combined overall cost will be awarded the majority of the LX(R) contract design support effort. This strategy will preserve a balanced and stable shipbuilding industrial base and sources of supply for LHA 8 and T-AO(X) and ensures competition for the construction of current and future classes of amphibious and auxiliary ships. The strategy also benefits DDG 51 surface combatants at HII Ingalls and the DoN's critical ship repair work at GD NASSCO.

The DoN appreciates the Congressional support and funding that has been provided towards a twelfth LPD 17 ship (LPD 28) and funding for the eleventh Joint High Speed Vessel (JHSV 11). These two ships will provide additional stability to HII Ingalls and Austal USA, the two shipbuilders of these ship classes. Working with Congress, the DoN hopes to continue stabilizing the industrial base through future MYP and block buy procurements, while maximizing our buying power through competition, the use of economic order quantities and by driving affordability earlier and throughout the life cycle.

3. LPD 28 AND THE SWAP AGREEMENT

With the previous FY 2013 advanced procurement funds, the recent FY 2105 appropriation of additional funds for LPD 28 and authority to incrementally fund the ship, the FY 2016 President's Budget request contains the balance of funding to procure this twelfth ship of the LPD 17 Class. The DoN has begun taking the necessary actions to procure LPD 28, and although construction is not anticipated until the fourth quarter of FY 2016, procurement of long lead time material will occur in the near future using FY 2013 advance procurement funds.

Associated with this procurement decision, is a provision within a 2002 agreement, commonly referred to as the DDG/LPD SWAP 1 agreement, which addressed awarding

equivalent workload to Bath Iron Works (BIW) on a sole source basis should LPD 28 be awarded to HII on a sole source basis. Specifically, SWAP 1 states that "if authorized by law and funds are appropriated, a fourth DDG 51 Class ship, or equivalent workload, would be awarded to GD [BIW] preceding, or concurrent with, the award of LPD 28 to NGSS [HII]." In 2009, the DoN, HII and BIW affirmed that the SWAP 1 Agreement "remain[ed] in full force and effect" at the time the parties executed the SWAP 2 Agreement, which allocated ship construction workload for the DDG 51 Class and the DDG 1000 Class programs. The purpose of the two SWAP agreements was to allocate workload between the two shipyards to ensure stability at both shipyards. The DoN is reviewing the SWAP 1 agreement and the subsequent SWAP 2 agreement to determine the extent to which its obligations relating to the workload allocation provision remain unfulfilled.

As the decision to procure LPD 28 is recent, the DoN has not fully considered all of the options, and has not had the opportunity to discuss this in detail with the shipbuilders. Prior to award of the LPD 28 detail design and construction contract and any final decision relating to the SWAP agreements, the DoN will provide Congress with an account of the options considered and the rationale used to arrive at its determination.

4. CONCLUSION

The DoN will continue to aggressively pursue the mutual objectives of improving the affordability of our shipbuilding program and increasing the strength of our shipbuilding industrial base. We believe that the use of MYP and block buy procurements provide the best means of ensuring both workload and financial planning stability and predictability to the industrial base. Coupled with the MYP and block buy procurements in the surface combatants sector, the DoN's recent announcement of an acquisition strategy of limited competition of the LHA 8 and T-AO(X) near term procurements has created a predictable and stable foundation for the non-nuclear shipbuilding sector through the end of the Future Years Defense Program.

Additionally, the DoN has begun taking the necessary actions to procure LPD 28. Prior to the detail design and construction contract award of LPD 28 and any final decision relating to the SWAP agreements, the DoN will provide Congress with an account of the options considered and the rationale used to arrive at its determination.

The DoN is committed to working closely with Congress and industry to provide continued stability, acquisition efficiency and cost savings opportunities. The greatest risk to this stability is associated with budget uncertainty, particularly the disruption and inefficiency caused by sequestration, delayed authorization and appropriations, and the looming budgetary challenge.

REPORT TO CONGRESS
ON
THE LONG-RANGE PLAN FOR
MAINTENANCE AND MODERNIZATION
OF NAVAL VESSELS
FOR FISCAL YEAR 2020

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Tables

Figures

I. Submission of the Report

This report provides the Department of the Navy (DoN) Long-Range Plan for the Maintenance and Modernization of Naval Vessels for Fiscal Year (FY) 2020. This plan complements the Navy's Annual Long Range Plan for Construction of Naval Vessels for FY 2020 and establishes the framework to effectively sustain our investments in today's fleet.

II. Key Themes

The *National Defense Strategy* provides the overarching guidance and high-level requirements for sustaining the *Navy the Nation Needs (NNN)*. The FY20 Maintenance and Modernization Plan begins to capture the requirements necessary to maintain the Navy's fleet mission-ready. This plan forms the basis for future industrial base capacity requirements with the following key themes:

- Supports the congressional policy direction for 355 battle force ships in the 2018 National Defense Authorization Act (Public Law 115-91).
- Shows that maintaining and modernizing the fleet requires a sustained and sufficient investment, and a close partnership with the public and private ship repair industrial base.
- Demonstrates that as the Navy grows to 355 battle force ships, the demand on the industrial base must evolve to effectively maintain and modernize a growing and changing fleet. This will require changes to industrial base infrastructure, workforce, and business processes to prepare for the future workload.
- Reaffirms that maintenance and modernizations rely on a robust and highly efficient supply chain to deliver material to the fleet. As the fleet grows in size, complexity and age, the supply chain (including the vendor base) must deliver the material support necessary to achieve the required level of readiness.
- Demonstrates that continued maintenance of ships in accordance with the applicable class maintenance plans is necessary to allow the Navy to achieve the maximum service life of ships and submarines as well as extend the service lives of select classes of ships to achieve a battle force of 355 ships.

This plan describes the Navy's continued challenges with high-tempo operations that has resulted in a maintenance backlog and reduced readiness rates for Navy ships. It is baselined on the current 2019 inventory and PB-2020 data with updates from the FY 2020 Shipbuilding Plan, planned selected service life extensions (SLEs), and projected decommissionings during the next 30 years. As with the FY2020 Shipbuilding Plan, it will address maintenance and modernization required of a fleet growing to 355 ships.

Table 1 shows the desired end state in quantity and fleet mix of the future 355 battle force ships as defined in the 2016 *NNN*.

Type	*NNN*
Ballistic Missile Submarine	12
Aircraft Carriers	12
Attack Submarines	66
Large, Multi-Mission, Surface Combatants	104
Small, Multi-Role, Surface Combatants	52
Amphibious Warfare Ships	38
Combat Logistic Force (CLF)	32
Command and Support	39
Total	**355**

Table 1. The Navy the Nation Needs

III. Overview of Maintenance and Modernization Capability

Private and public shipyards perform depot-level maintenance and modernization availabilities and are supported by a nationwide network of vendors for materials. Private shipyard work consists primarily of maintenance availabilities on non-nuclear surface ships contracted in accordance with federal acquisition regulations. The four public naval shipyards (NSYs) perform work primarily on nuclear aircraft carrier and submarine availabilities, maintaining some unique core capability on surface ship systems.

A. Private Sector

The Navy's Regional Maintenance Centers (RMCs) manage, oversee, and contract with private sector shipyards for maintenance work packages within their regions. Award of contracts for out-of-region and multi-ship contracts are managed by Naval Sea Systems Command and administered via the assigned Naval Supervising Activity. Fleet maintenance schedulers from U. S. Fleet Forces Command and Commander, Pacific Fleet continuously balance operational commitments against engineered maintenance periodicity and industrial base constraints to develop an executable maintenance and modernization schedule. The Military Sealift Command (MSC) performs analogous functions to maintain the fleet of combat logistics force (CLF) and fleet support vessels.

Several aspects are considered when describing the industrial base, including quantity and capability of dry docks and regional port work loading. Navy-certified dry docks are required for Navy ships. As laid out in the *Surface Navy Dry Dock Study – Final Report* (February 18, 2016), there are 21 certified dry docks used for private shipyard availabilities that are listed in Table 2.

Fleet	Port	Number of Certified Dry Docks	Homeported Surface Ships
Atlantic	Norfolk, VA [1]	6	34
	Mayport, FL [1]	2	15
	Charleston, SC	3	0
	Pascagoula, MS	1	0
	Great Lakes & Bath	2	0
	Atlantic Total	14	49
Pacific	San Diego, CA [1]	4	45
	Pearl Harbor, HI [1]	1	10
	Seattle (Everett), WA [1]	1	5
	Portland, OR	1	0
	Pacific Total	7	60
	Total	21	109

Note 1: Only includes non-nuclear surface ships.

Table 2. Private Shipyard Dry Docks Locations

The ratio of ships to dry-docks present in the Pacific presents a significant challenge that reduces margin for schedule changes and growth. The Navy has conducted a market survey of available/potential dry docks and is developing a long-range plan to increase the number of certified dry docks in the Pacific (and elsewhere if required) to reduce this shortfall.

To meet this challenge, the Navy continually optimizes regional port loading by adjusting ship schedules in order to develop executable availabilities and best use available capacity. The RMCs develop plans that address ship and submarine maintenance programming, budgeting, and execution. These plans forecast private sector workload and show projected capacity of the industrial base, based on input provided by each of the regional ship repair associations. The Navy is continuously reviewing ship maintenance and modernization requirements and private sector port loading, and works to provide a predictable and stable workload to industry. The Navy provides a quarterly port loading assessment to Congress as required by the FY 2017 National Defense Authorization Act (Public Law 114-328).

B. Public Sector

The four public NSYs (see Table 3) – Portsmouth Naval Shipyard (PNS), Norfolk Naval Shipyard (NNSY), Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF), and Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (PHNSY & IMF) – are essential elements of U.S. national security. The government-owned and operated naval shipyards repair, modernize, perform submarine refueling, inactivate, conduct emergency repairs and provide for mobilization and national defense contingency situations. Their primary mission is to accomplish depot- and intermediate-level maintenance and modernization work to ensure the Navy's nuclear aircraft carriers and submarines are available to meet the Nation's needs.

NSY	Location	FY18 Civilian End Strength	FY18 Total Revenue ($M)	FY18 Workload (Man-days (K))	Dry docks	Capabilities
PNS	Kittery, ME	6,023	977	897	3	Only East Coast NSY capable of refueling LOS ANGELES Class. Capable of working on LOS ANGELES and VIRGINIA Classes.
NNSY	Portsmouth, VA	11,037	1,675	1,588	4	Only East Coast NSY capable of docking aircraft carriers. Capable of working on all classes of Navy vessels.
PSNS & IMF	Bremerton, WA	13,905	2,175	2,193	7	Primary West Coast NSY for support of aircraft carriers. Only nuclear reactor disposal/recycling site.
PHNSY & IMF	Pearl Harbor, HI	5,549	945	762	4	Largest repair facility between the West Coast and Far East. Capable of working on surface combatants and submarines.

Table 3. Public Shipyard Overview (Source: PB20 OP-5A)

In order to complete their primary mission, NSYs are investing in their infrastructure. In 2018, most naval shipyard capital equipment was assessed as beyond effective service life, obsolete, unsupported by original equipment manufacturers, and at operational risk. This aged equipment increases submarine and aircraft carrier depot maintenance costs, schedules and reduced NSY capacity. Modernizing naval shipyard capital equipment is therefore essential to meeting future capacity and capability requirements, and maximizing fleet readiness.

Dry dock investments are needed to support USS GERALD R FORD Class and USS VIRGINIA Class including VIRGINIA Payload Module variants, as well as to implement seismic and flood- protection improvements. The Navy's *2018 Shipyard Infrastructure Optimization Plan (SIOP),* discussed below, will restore 67 of 68 NSY availabilities that are at risk over the next 20 years for movement, deferral, or rescheduling due to dry dock capability gaps. Table 4 summarizes the NSY dry dock capability.

#	Dry Dock	Current Capability	Configuration and Condition
1	NNSY Dry Dock 4	All SSN Classes and SSBN/SSGN 726 Class	Requires repairs in FY19 & FY20 (RM12-1896 Phase I &II) for continued certification and use.
2	NNSY Dry Dock 2	SSN 688 Class and SSN and SSN 774 Class without Virginia Payload Module	Not SSN 774 with VIRGINIA Payload Module capable and will require rehabilitation.
3	NNSY Dry Dock3	SSN 688 Class and SSN 774 Class	Requires significant rehabilitation.
4	NNSY Dry Dock 8	CVN 68 Class, SSBN/SSGN 726 Class, and all SSN Classes	Does not support CVN 78 Class
5	PHNSY & IMF Dry Dock 2	SSN 688 Class	Will be obsolete in FY30 after last SSN 688 Class availability.
6	PNS Dry Dock 1	SSN 688 Class with Buoyancy Assist Tanks only	Does not support SSN 774 Class. Currently requires buoyancy assist tanks for SSN 688 Class that reach end of service life in FY21.
7	PSNS & IMF Dry Dock 3	SSN 688 RCDs Only	Will be obsolete after last SSN 688 Class RCD in FY39.
8	PSNS & IMF Dry Dock 6	CVN 68 Class, SSBN/SSGN 726 Class, and all SSN Classes	Does not support CVN 78 Class

Table 4. Naval Shipyard Dry Dock Capability

C. Industrial Base Initiatives

Two governing documents guide the Navy's efforts to improve the effectiveness of the NSYs. First, the Naval Shipyard Development Plan Report to Congress (March of 2018) provides a detailed workforce development plan. Second, the *SIOP* provides the strategy to optimally size, configure, and locate facilities at the four public shipyards to best execute the mission requirements. The *SIOP* includes engineering analysis and strategy for optimal placement of facilities and major equipment at each public shipyard, which will restore badly outdated facilities while simultaneously reducing total personnel and material travel and movement by an average of 65 percent, which equates to recovering 328K man-days per year. The *SIOP* includes a 20-year investment plan for infrastructure needed to ensure the Navy is providing the shipyard capacity and capability the Nation needs. Funding for initial modeling and optimization analysis efforts is included in FY 2020.

For private shipyards, the Navy, in conjunction with the ship repair industry, is developing *Private Shipyard Optimization (PSO)* initiatives for optimal placement of facilities and major equipment in each region. This includes an investment plan for infrastructure needed to support availability maintenance in support of a 355-ship Navy. The *PSO* results are expected in time to support the FY 2021 budget request. Working closely with private shipyards, the Navy is also implementing a *Private Sector Improvement*

(PSI) program that addresses workload stability, governance, contracting and process optimization. The goal of the *PSO* and *PSI* initiatives is to identify and eliminate barriers to private sector ship availability throughput to affordably achieve on time delivery of surface ships.

Both public and private plans specifically focus on three major areas of improvement: dry dock capacity and survivability, facility layout and infrastructures optimization, and capital equipment requirements and modernization. This plan focuses on recovering and modernizing the nation's current capability and capacity. In this new era of great power competition, a follow-on plan will focus on potential surge requirements resulting from unplanned increases in operational tempo or battle damage.

IV. Long-Range Plan

This plan will address lifecycle maintenance and modernization processes for the types of ships delineated in Table 1, examines the national industrial base for ship repair, and looks ahead over the next 30 years as the fleet grows to 355 battle force ships. Projected ship inventories and planned availability induction schedules are provided in Appendix 1, Tables 5-6.

The Navy will develop a long-range maintenance and modernization requirements based on technical analysis and condition assessment of the fleet driven by the number of ships in the FY 2020 Shipbuilding Plan. The maintenance and modernization processes for all battle force ships are analogous. Maintenance and modernization are performed in the industrial base comprising of both public and private shipyards. Achieving and sustaining 355 battle force ships will require a continuous investment in the public and private industrial capacity and capability. This includes investments in additional infrastructure (e.g., dry docks and piers), training, and manpower. Shipyard capacity and workload leveling challenges will also require all stakeholder's attention to ensure maintenance and modernization can be performed in a timely and efficient manner.

Maintenance and modernization requirements must be fully funded and efficiently executed to reduce deferred maintenance that adds risk to future fleet readiness. Risks to be addressed during the next 30 years include optimizing maintenance and modernization business processes (e.g., availability planning and execution) and adjusting the industrial base capacity and capability as the fleet grows to 355 ships. Finally, the Navy must stabilize the vendor base by forecasting future logistics requirements (material availability) required to maintain fleet reliability and reduce the risk to readiness.

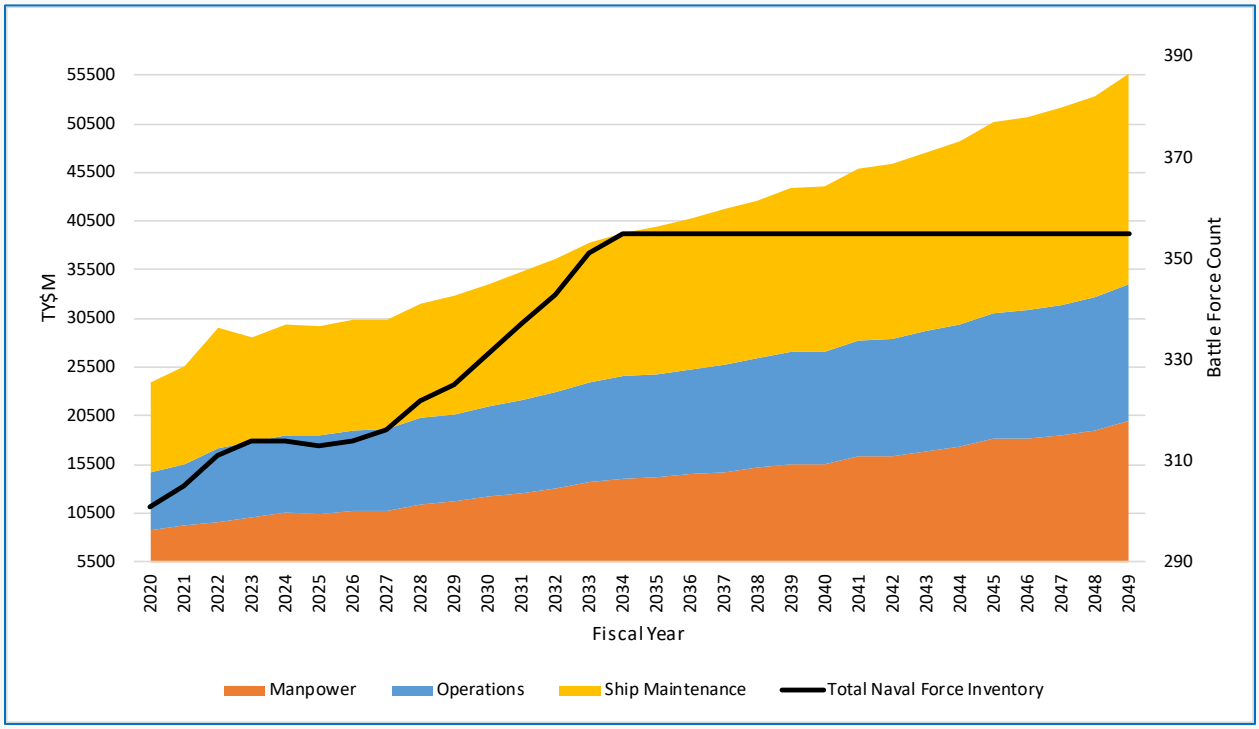
Recognizing these risks, the Navy has embarked on several initiatives to improve business processes and address infrastructure and workforce issues for the public and private shipyards as discussed in section III. C. For example, the *PSO*/*PSI* initiatives will address appropriate risk sharing, timely repair availability completion, and streamlined business processes at private shipyards and the supporting vendor base.

The Navy's three central life-cycle management activities (i.e., Carrier Planning Activity, Surface Maintenance Engineering Planning Program, and Submarine Maintenance Engineering, Planning and Procurement Activity) use similar overall end-to-end processes for planning and programming maintenance outlined in the Joint Fleet Maintenance

Manual (JFMM). MSC follows similar processes to maintain their fleets. These common processes will enable the projection of required maintenance schedules for the next 30-plus years and results in repeatable, defendable, and traceable estimates.

Navy's modernization processes are guided by the JFMM, Maintenance Policy for United States Navy Ships, and the Navy Modernization Process Management and Operations Manual. The Navy employs a modernization program that captures changing modernization requirements with frequent reviews during the availability planning cycle. Technical maturity and certification status are monitored continuously throughout the maintenance cycle through the Modernization Readiness Assessment process. Modernizations are approved and scheduled based on attributes such as safety and security, survivability, communications and technology, reliability and maintainability, obsolescence, warfighting, cost, and return on investment. Appendix 1, Table 7 lists planned/ongoing major modernizations by class through the Future Years Defense Program (FYDP) and will be used to inform future modernization that is driven by the requirement to pace the threat with new technologies.

Figure 1 provides the sustainment funding from the FY 2020 Shipbuilding Plan. This sustainment estimates includes personnel, planned maintenance and some operations. For maintenance, these estimated cost provide a rough order of magnitude beyond the FYDP and can be helpful in identifying future areas of concern. For budgetary details associated with maintenance in the FYDP, see Appendix 2. For workloads at the private and public shipyards, see Appendix 3.



Notes: Shows personnel, maintenance and operations programmed in the FYDP for ships in the battle force by ship type. Beyond the FYDP, the funding is inflated from FY24, again by projected ship type (mix varies by year).

Figure 1. Annual Funding for Sustainment (FY2020-2049)

Going forward, the Navy will refine this report to account for the delivery of new ships, planned SLEs and future modernization in order to project the total requirement for depot level maintenance and modernization at the private and public shipyards. The Navy recognizes that the U.S. ship maintenance and modernization industrial base is a national enterprise that also supports other agencies. Managing all the U.S. industry resources requires significant coordination and the Navy has started an effort to expand this analysis to include ship maintenance and modernization needs by the U.S. Coast Guard, U.S Maritime Administration, the National Oceanic and Atmospheric Administration, and the U.S. Army.

V. Summary of Key Enablers

There are four key enablers to efficiently maintain and modernize the Navy's growing fleet of battle force ships over the next 30 years. In order to achieve the long-range maintenance and modernization requirements in this plan based on the FY 2020 Shipbuilding Plan, the Navy must address industrial base capacity and capability, shipyard level loading, workforce and facilities investments.

A. Industrial Base Capability and Capacity

As shown in this plan, sustaining 355 battle force ships requires an increase and upgrade of public and private industrial capability and capacity. The Navy regularly engages with industry via the Shipbuilders Council of America and the regional ship repair associations. The next National Ship Repair Industry Conference is scheduled for April 2019. Additionally, quarterly port loading assessments are provided to Industry and to Congress. The *PSO* initiatives for private shipyards and *SIOP* for public shipyards will focus on future requirements for dry docks, facilities and capital equipment modernization. For private shipyards, the Navy conducted a market survey for available and potential commercial dry docks and is developing a long-range plan to increase the number of available certified dry docks. The *PSI* initiatives address industrial base health and workload stability, contracting, change management and availability execution at private shipyards. For example, *PSI* initiatives include a change in how growth and new work items are approved. Small value changes historically account for 70 percent of growth and new work, utilizing pre-priced changes will significantly reduce cycle time for approval. Full implementation of the *SIOP* and *PSO*/*PSI* initiatives are key to meeting the requirements of this plan.

B. Shipyard Level loading

The Navy is committed to working with private industry to provide them a stable and predictable workload in a competitive environment, so they can hire the workforce and make the investments necessary to maintain and modernize the Navy's growing fleet. This will help ensure the Navy attains the best value for the taxpayer. The Navy continuously works to smooth the workload by addressing identified peaks and valleys in the workload. Like the private shipyards, the public shipyards benefit from a stable and predictable workload enabling them to conduct the work, train the workforce, and maintain their infrastructure.

C. Workforce

Across the U.S., many industries are challenged to fill positions with qualified people. Blue collar employment in fleet concentration areas is a particular challenge. To help address this, the Navy will look for opportunities at the state and federal levels to obtain funding to invest in training programs in order to grow the pool of available workforce. Private shipyards' ability to provide workforce stability is tied to Navy's ability to predict workload as described above. The *PSI* initiatives will provide opportunities for industry to improve efficiency and invest in their workforce. For public shipyards, the Navy achieved 36,100 full time employees in FY 2019, one year ahead of original plan. To bring new hires up to speed more quickly, the public shipyards have developed an improved training model that gets new hires to the waterfront where they can learn hands-on, under the tutelage of experience journeyman, shortening the time from productive contribution for new employees from up to two years to now under six months.

D. Facilities Investment

The *SIOP* initiatives provide a roadmap of future investments to improve facility infrastructure to support maintenance and modernization work in private and public shipyards. Investments in government facilities to support private sector work (piers and access) are also required and the *PSO* will provide a similar roadmap. The FY 2020 funding request includes $92 million in FY 2020 that supports the completion of the *SIOP* shipyard infrastructure masterplans, industrial analysis, environmental and historical plans/mitigations, and begins the standard facility designs for the optimized shipyard layout. In FY 2020, there is additional funding for military construction and capital equipment.

VI. Conclusion

Sustaining the 355-ship fleet will require changes to both public and private industrial capability and capacity. Current infrastructure will require update and refurbishment to support modern classes of ships and repair. Likewise, additional dry docks will be needed to address the growing fleet size. Navy and industry partners must create work environments where talented Americans will want to work and contribute to the national defense. This includes investments in updating facilities and capital equipment, and as well as providing that workforce training that is both modern and relevant and compensation commensurate with the skill required to repair Navy ships. Finally, we must avoid feast and famine cycles that erode both the repair industrial base and the underlying vendor supply base. Consistent funding matched to steady demand for work will enable the repair base, public and private, to grow to meet the needs of the 355-ship Navy.

Appendix 1: Battle Force Fleet Inventory, Availability Induction Schedule, and Major Modernizations

Maintenance

Table 5 (from the FY 2020 Shipbuilding Plan) shows the projected Battle Force Inventory over the next 30 years, reaching 355 ships in FY 2034.

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Aircraft Carrier	11	11	11	11	11	10	10	9	10	10	10	10	10	10	10	10	10	10	10	10	9	10	9	9	9	10	9	9	9	10
Large Surface Combatant	94	92	93	95	94	95	96	100	102	104	107	110	112	115	117	114	109	107	108	105	105	104	106	108	109	107	106	107	109	108
Small Surface Combatant	30	33	33	32	35	35	36	38	41	43	45	47	49	50	52	55	57	58	59	61	62	61	60	57	55	55	54	54	51	50
Attack Submarines	52	53	52	51	47	44	44	42	42	44	46	48	49	51	53	54	56	58	57	58	59	59	61	61	62	63	64	65	66	67
Large Payload Submarines	4	4	4	4	4	4	2	1																1	1	1	2	2	2	3
Ballistic Missile Submarines	14	14	14	14	14	14	14	13	13	12	11	11	11	11	11	11	11	10	10	10	10	11	12	12	12	12	12	12	12	12
Amphibious Warfare Ships	33	34	34	35	36	37	38	37	38	36	36	36	36	38	36	34	35	35	35	37	37	37	36	36	36	36	37	35	35	35
Combat Logistics Force	29	30	31	31	32	32	31	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	31
Support Vessels	34	34	39	41	41	42	43	44	44	44	44	43	44	44	44	45	45	45	44	42	41	41	39	39	39	39	39	39	39	39
Total	**301**	**305**	**311**	**314**	**314**	**313**	**314**	**316**	**322**	**325**	**331**	**337**	**343**	**351**	**355**	**355**	**355**	**355**	**355**	**355**	**355**	**355**	**355**	**355**	**355**	**355**	**355**	**355**	**355**	**355**

Table 5. Naval Battle Force Inventory

Table 6 lists the 2018 schedule of depot-level maintenance availability inductions.

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Aircraft Carrier	4	5	3	4	5	3	3	2	6	4	2	7	3	3	5	4	2	4	5	3	5	4	3	5	3	3	6	4	3	6
Large Surface Combatant	42	41	35	39	44	43	46	33	47	43	36	54	37	41	52	41	34	54	42	38	54	38	43	49	41	37	52	39	33	43
Small Surface Combatant	13	12	16	11	14	11	14	14	18	18	20	22	23	25	28	27	32	27	32	30	33	27	30	30	28	28	30	30	25	28
Attack Submarines	7	12	7	7	6	8	11	8	14	6	11	8	10	9	6	7	7	8	7	8	9	8	8	10	10	8	8	10	10	11
Large Payload Submarines	1	1	1	1	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Ballistic Missile Submarines	2	1	1	1	1	0	1	1	2	1	2	1	0	1	0	3	1	2	0	1	1	0	0	0	0	0	0	1	0	0
Amphibious Warfare Ships	15	14	13	10	9	10	10	13	11	9	15	13	9	16	12	15	19	13	15	23	16	14	23	21	18	26	22	20	24	21
Combat Logistics Force	29	30	31	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Support Vessels	21	20	21	21	21	22	22	23	23	23	23	22	23	23	23	24	24	24	22	22	21	21	21	21	21	21	21	21	21	21
Total	134	136	128	126	132	129	141	127	154	136	141	159	137	150	158	153	151	164	155	157	171	144	160	168	153	155	171	157	149	162

Table 6. Depot-Level Availability Induction Schedule for Naval Battle Force

Modernization

Table 7 lists planned/ongoing major modernizations by class through FYDP.

Type	System/Equipment	
Ballistic Missile Submarine	• CCS TI-16/18 • LVA • CANES • LPE	• CSRR Inc 1 V(3) & Inc 1 V(4) • Ship Control System OER • Cyber RMF ATO
Aircraft Carriers	• JSF • MQ-25A • eCASS • MK 38 • NGSSR • CANES • NTCDL • DCGS-N • NMT • GPNTS • PCMS	• SSEE Inc F • SPN-50 and SYY-1 (ATC) • Cybersecurity Upgrades • Modular Reefer System • SATCC AN/SSC-13 • HYDRA Tech Refresh • Steering Control Systems Upgrades • CRDC Block 1 • SPY-6(V)2 EASR • SSDS MK 2 Mod 1C/1E • SLQ-32(V)6 SEWIP Block 2
Attack Submarines	• CCS TI-16/20 & 16/22 & 18 • LVA • CANES • LWLCCA • ICCP OER • EW & ISIS TI-16/20 & 18 • CSRR Inc 1 V(3) & Inc 1 V(4) • ICS Block 1/2 & Block 3/4	• Acoustic Superiority (Machinery and Treatment) • Ship Control System Processor modernization • SSTG DVR Upgrade • SSTG Governor OER • Forward ABT Power Mod • CKT D Block 1/2 and Block 3/4 OER • Propulsor Upgrade • SSTG Reliability Upgrades • Atmosphere Control • Service Life Extension Modernization • Cyber RMF ATO
Guided Missile Submarines	• CCS TI-16/18 • LVA • CANES	• LPE • CSRR Inc 1 V(4) • Cyber RMF ATO
Large Surface Combatants	• Aegis B/L9A • SPQ-9B • BMD (DDGs only) • VLS Upgrades • IBNS • Habitability Mods	• SQQ-89(V)15 • Machinery Control Upgrades • CEC • SEWIP Blk 2/3 • Cybersecurity Upgrades • AMDR w/Aegis B/L 10 (Flt IIA DDGs only)
Small Surface Combatants	• AMDR – Air and Missile Defense Radar	• AMDR – Air and Missile Defense Radar
Amphibious Warfare Ships	• JSF • SSDS • HM&E • ADNS • CANES	• NDDS • SAP-F • ISMT • Lithium Ion Battery Stowage • Troop & MAGTF Armories

Type	System/Equipment	
	• NAB • SATCC • NMT • GBS	• Magazine Sprinkling Detection System • DC and Ballast Upgrades • Machinery Control Upgrades
Combat Logistics Force	• HM&E • CMWD Piping • Lightering at Sea Capability	• Navigation & Comms Upgrades • Machinery Controls Upgrades • STREAM Navy Standard • Transmission Replacement
Fleet Support	• HM&E	• Engine Upgrades

Acronyms:

ABT – Automatic Bus Transfer
ADNS – Automated Digital Networks System
ALIS – Autonomic Logistics Information System
AMDR – Air and Missile Defense Radar
ATC – Air Traffic Control
ATO – Authority to Operate
BMD – Ballistic Missile Defense
C2P – Command and Control Processor
CANES – Consolidated Afloat Network and Enterprise Services
CCS – Combat Control System
CKT - Circuit
CMWD - Countermeasure Washdown
Comms – Communications
CRDC – Close-In Weapon System (CIWS)/Rolling Airframe Missile (RAM) Defensive Capability
CSRR – Common Submarine Radio Room
DC – Damage Control
DCGS-N – Distributed Common Ground System - Navy
DVR- Digital Voltage Regulator
EASR – Enterprise Air Surveillance Radar
eCASS – Electronic Consolidated Automated Support System
GBS – Global Broadcast System
GPNTS – Global Positioning, Navigation, and Timing Service
HM&E – Hull, Mechanical and Electrical
HYDRA – Hierarchical Yet Dynamically Reprogrammable Architecture
ICCP – Impressed Current Cathodic Protection
ICS – Integrated Communications System
Inc – Increment
ISMT – Indoor Simulated Marksmanship Trainer
JSF – Joint Strike Fighter
ISIS – Integrated Submarine Imaging System
LPE – Low Pressure Electrolyzer
LVA – Large Vertical Array
LWLCCA – Light Weight Low Cost Conformal Array
MAGTF – Marine Air-Ground Task Force
Mod – Modification
MST – Maritime Surface Terminal
NAB – Naval Amphibious Baseline
NDDS – Navigation Data Distribution System
NGSSR – Next Generation Surface Search Radar
NMT – Navy Multiband Terminal
NTCDL – Network Tactical Common Data Link
OER – Over Excitation Regulator
PCMS – Passive Countermeasures System
RMF – Risk Management Framework
SAP-F – Special Access Program Facility
SATCC – Shipboard Air Traffic Control Communications
SEWIP – Surface Electronic Warfare Improvement Program
SSDS – Ship Self Defense System
SSES – Ship's Signals Exploitation Equipment
SSTG – Ship Service Turbine Generator
STREAM – Standard Replenishment Alongside Method
TI – Technical Insertion
(V) – Version

Table 7. Battle Force Inventory Major Modernizations by Type Planned for FY20-FY24

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Appendix 2: PB-20 Maintenance Funding

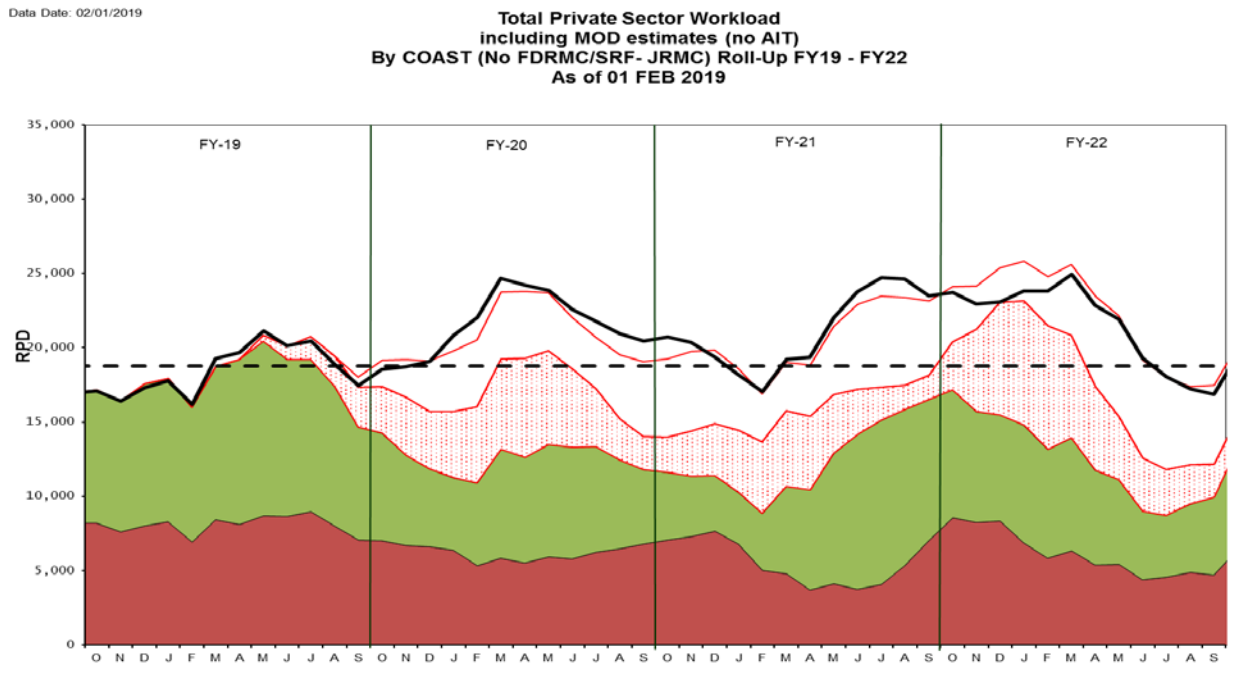
Table 8 shows the PB-20 maintenance funding.

	FY20	FY21	FY22	FY23	FY24	FYDP
Combatant Type	**($M)**	**($M)**	**($M)**	**($M)**	**($M)**	**($M)**
Ballistic Missile Submarine	864.4	650.6	535.5	517.6	535.5	3103.7
Aircraft Carriers	2029.7	1703.2	2040.6	2240.7	2110.5	10124.7
Submarines	3297.8	3232.9	3057.2	3078.3	3077.7	15743.8
Large Surface Combatants	2003.3	1811.9	1650.1	1766.6	2095.6	9327.5
Small Surface Combatants	683.9	791.0	992.5	931.1	1020.2	4418.6
Amphibious Warfare Ships	1380.8	1180.1	1438.7	1434.4	1603.3	7037.3
Mine Warfare	145.8	104.9	79.1	45.8	33.6	409.3
Combat Logistics	360.2	370.3	439.1	436.2	353.3	1959.2
Fleet Support	2.7	2.5	2.6	2.7	2.7	13.4
Total ($M)	**10768.6**	**9847.4**	**10235.4**	**10453.4**	**10832.4**	**52137.5**

Table 8. PB-20 Maintenance Funding

Appendix 3: Workload at the Private and Public Shipyards

Table 9 and 10 provides private shipyards surface workloads and public shipyard workloads.



Total FY Man-Days	4,658,695	5,258,879	5,163,862	5,566,939
Average FY RPDs	18,511	20,851	20,543	22,290

Table 9. Private Shipyard Surface Workload

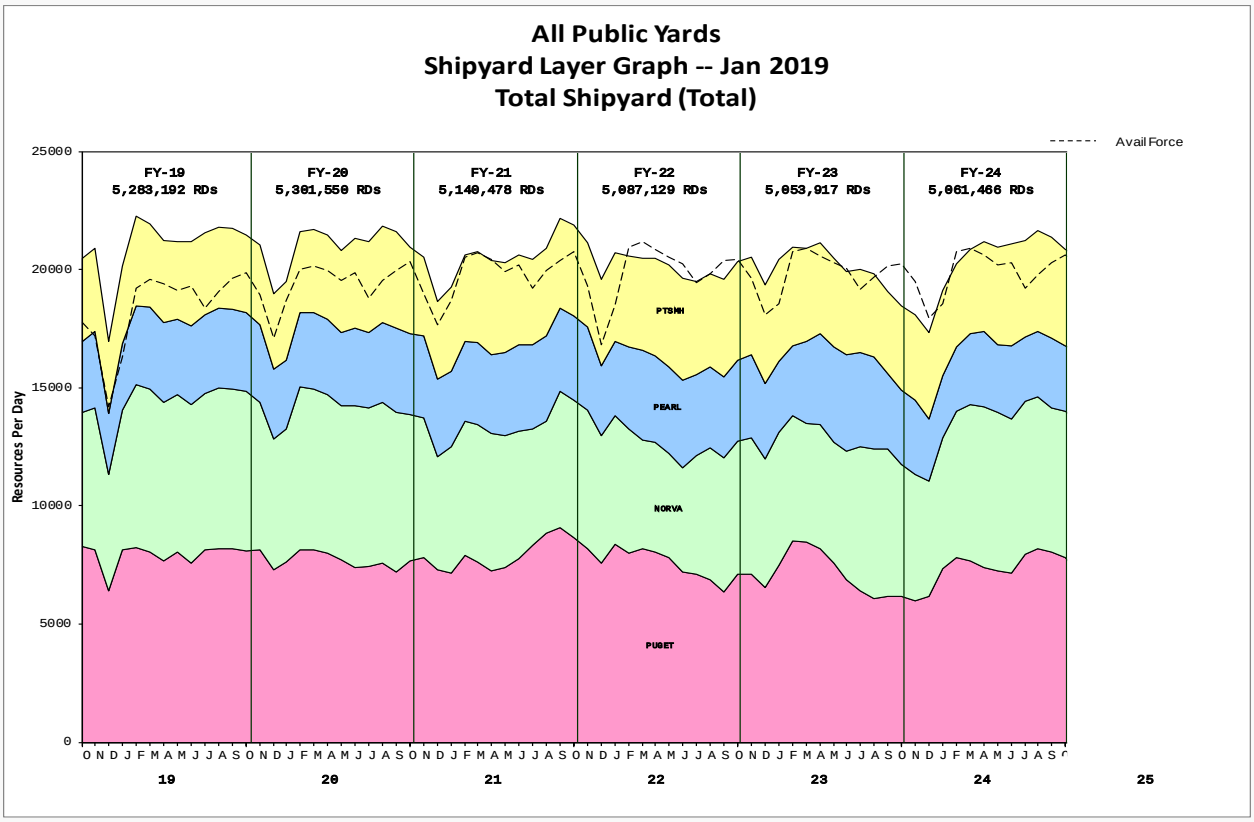


Table 10. Public Shipyard Workload

Appendix 4: Acronym List

CG	Guided Missile Cruiser
COMSC	Commander, Military Sealift Command
CONUS	Continental United States
CVN	Multi-purpose Aircraft Carrier, Nuclear-powered
DDG	Guided Missile Destroyer
DoD	Department of Defense
DoN	Department of the Navy
FAST	Fleet Availability Scheduling Team
FY	Fiscal Year
FYDP	Future Years Defense Program
GAO	Government Accountability Office
IMF	Intermediate Maintenance Facility
JFMM	Joint Fleet Maintenance Manual
LCC	Command Ship
LCS	Littoral Combat Ship
LHA	Amphibious Assault Ship (general purpose)
LHD	Amphibious Assault Ship (multi-purpose)
LPD	Amphibious Transport Dock
MCM	Mine Countermeasures Ship
MSC	Military Sealift Command
NAVSEA	Naval Sea Systems Command
NNN	Navy the Nation Needs
NNSY	Norfolk Naval Shipyard
NSY	Naval Shipyard
OSD	Office of the Secretary of Defense
OMN	Operation and Maintenance, Navy
OPNAV	Office of the Chief of Naval Operations
PHNSY	Pearl Harbor Naval Shipyard
PNS	Portsmouth Naval Shipyard
POM	Program Objective Memorandum
PSI	Private Sector Implementation

PSNS	Puget Sound Naval Shipyard
PSO	Private Sector Optimization
RCD	Reactor Compartment Disposal
RMC	Regional Maintenance Center
SIOP	Shipyard Infrastructure Optimization Plan
SLE	Service Life Extension
SSBN	Ballistic Missile Submarine (nuclear-powered)
SSGN	Guided Missile Submarine (nuclear-powered)
SSN	Submarine (nuclear-powered)
SSXN	Large Payload Submarine (nuclear-powered)
T-AGOS	Surveillance Ship
T-AKE	Dry Cargo and Ammunition Ship
T-AO	Fleet Replenishment Oiler
T-AOE	Fast Combat Support Ship
T-ARS	Salvage Ship
T-ATF	Fleet Ocean Tug
T-ATS	Towing, Salvage, and Rescue Ship
T-EPF	Expeditionary Fast Transport
T-ESB	Expeditionary Sea Base
T-ESD	Expeditionary Transfer Dock
TFP	Technical Foundation Paper
USNS	United States Naval Ship
USS	United States Ship

Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2019

Prepared by:

Office of the Chief of Naval Operations

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Washington, DC 20350-2000

February 2018

The estimated cost of this report or study for the Department of Defense is approximately $394,000 in Fiscal Years 2017 - 2018. This includes $241,000 in expenses and $153,000 in DoD labor.

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Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2019

Table of Contents

Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year (FY) 2019

I. Reporting Requirement

This report is submitted per Section 231 of Title 10, United States Code. Appendices 1-8 provide supporting details. Appendix 8 is controlled under limited distribution.

II. Submission of the Report

This report is the Department of the Navy's (DoN) 30-year shipbuilding plan for FY2019-FY2048. The FY2019 President's Budget (PB2019) provides sufficient funding to procure the ships included in the FY2019-FY2023 Future Years Defense Program (FYDP). Per FY2018 National Defense Authorization Act (NDAA) direction, Auxiliary vessels are now included in this report (Appendix 7). Unless otherwise noted, funding levels are shown in constant year FY2018 dollars.

III. Key Themes in this Report

The National Defense Strategy provides the overarching guidance and high level requirements for establishing the *Navy the Nation Needs (NNN)*, the Navy's plan for building and sustaining a lethal, resilient force through balanced investments across readiness, capability, and capacity. This 30-year shipbuilding plan is the foundation for growing capacity with the following key themes:

- Acts on the policy legislation provided by Congress in the 2018 NDAA, which supports Navy's validated NNN requirement for 355 Battle Force ships.
- Includes 54 Battle Force ships within the FYDP (11 more than PB2018 request), and all candidate Service Life Extensions (SLE).
- Anticipates achieving a 355 ship Battle Force beyond 2050, but also frames options for potentially accelerating to the 2030s with additional resources, service life extensions, and strong industry response.
- Provides scalable acquisition profiles that promote a stable and efficient industrial base that encourages industry investment in capital improvements, capital expansion, and a properly sized world-class workforce.

IV. Force Structure Assessment and Fleet Architecture

In December 2016, the Chief of Naval Operations completed a Force Structure Assessment (FSA) to determine the correct balance and mix of platforms needed to address the evolving and increasingly complex responsibilities of the Navy. The FSA detailed a requirement for 355 ships based upon analysis and acceptable strategic and operational risk. In accordance with the FY2016 NDAA, and in addition to the FSA, the Navy also sponsored three independent studies of alternative fleet architectures for the 2030 timeframe, roughly the middle of the timeframe covered by this report. The findings of these studies were assessed and incorporated into the 355 ship architecture, as were the most promising elements of advanced development

and rapid fielding efforts supported by a robust program of war games, technology demonstrations, and prototyping. The Navy then commissioned a "red team" to evaluate these studies to further refine the "best of breed" alternatives. The resulting mix of 355 ships was in-turn supported by 2018 NDAA legislation as the required Battle Force for the NNN. Results are summarized in Appendix 1, Table A1-1.

V. Unmanned Systems

Unmanned systems were included in the above analysis and continue to advance in capability and capacity. These systems are key enablers for the battle force through all phases of warfare and are integral to Navy's wargames, exercises and real-world operations. For PB2019, unmanned systems are not included in the shipbuilding plan; rather, they are accounted for in advanced capability weapons and sensors portfolios. Navy is committed to unmanned capabilities and will continue to evaluate progression as they potentially move more towards viable platform replacement options.

VI. Long-Range Plan – Balanced, Stable, Scalable

The National Defense Strategy (NDS) articulates how the United States military will compete, deter and win with a more lethal, resilient, and rapidly innovating Joint Force in an increasingly complex security environment. This environment is defined by rapid technological change, challenges from adversaries in every operating domain, and the impact on readiness from the longest continuous stretch of armed conflict in our Nation's history. The Navy's overarching plan in support of the NDS is referred to as the *Navy the Nation Needs (NNN)*. The six pillars of the NNN are Readiness, Capability, Capacity, Manning, Networks, and Operating Concepts. These six pillars must remain balanced and scalable in order to field the needed credible naval power, guarding against over-investment in one area that might disadvantage another. This disciplined approach ensures force structure growth accounts for commensurate, properly phased investments across all six pillars – a balanced warfighting investment strategy to fund the total ownership cost of the Navy (manning, support, training, infrastructure, etc.).

Within this context, this shipbuilding plan defines the framework for working together with Congress to attain the 355 ship NNN warfighting requirement per the 2018 NDAA. There are three prioritized elements of the shipbuilding plan that the Navy will pursue to grow the force.

(1) Steady, Sustainable Growth (SG). Establish minimum baseline acquisition profiles that grow the force at a sustainable, affordable rate while protecting the overall balanced warfighting investment strategy. Of particular importance is the sustainment of the industrial base at a level that supports affordable acquisition, predictable and efficient maintenance and modernization, and an appropriately sized workforce for more aggressive growth if additional resources become available. Steady profiles ensure there is enduring focus on the long-view.

(2) Aggressive Growth (AG). More quickly attains the same warfighting requirement as available industrial capacity and increased resources permit, building upon the foundation of steady growth without threatening the long-term competitive posture of a balanced warfighting investment plan. This is the demarcation between a profile that must be sustained (steady growth) and a profile that can be attained (aggressive growth). Navy will proactively invest above the baseline steady profiles if also able to remain balanced across the NNN pillars.

(3) Service Life Extensions (SLE). SLEs provide near-term opportunities to sustain

inventory to more rapidly achieve NNN requirements. Because SLEs are relatively short-term extensions, they are carefully balanced with the steady long-term growth profiles discussed above to ensure overall higher numbers when SLEs expire. Candidate ships are evaluated for restoration, their ability to be upgraded with current systems, anticipated additional life, and cost vs. replacement (or other higher priority investments). Reactivation of retired Battle Force ships to sustain the force is also considered under this priority; however, due to their poor condition they typically provide a limited return on investment.

The PB2019 30-year shipbuilding plan includes 54 Battle Force ships within the FYDP, 11 more than PB2018; 4 of which filled gaps to achieve the long-term profiles (steady growth) and an additional 7 that were able to be added above the steady growth profiles (aggressive growth). All SLE candidates meeting criteria were also funded, including six Ticonderoga class cruisers, four Mine Countermeasures ships, and the first of potentially five Los Angeles class attack submarines.

Appendix 3, Tables A3-1 through A3-4 illustrate the 30-year program that builds toward the NNN objective at a steady, sustainable, and affordable rate, projected to reach the approximate mix of 355 ships in the early 2050s. As shown in Appendix 5, Figure A5-1, average ship construction funding across the FYDP is $20B per year (FY18 constant dollars), which along with the funded SLE's provides firm near-term footing for moving forward. Beyond the FYDP, additional funding would be needed to sustain steady growth and to account for the serial production of the Columbia class SSBN. Aggressive growth options would come after that. With a diligent approach to SLEs, strong industry response, and additional resources, 355 ships could be attained by the 2030s.

Given that the types of ships and capabilities procured over this 30-year timespan will evolve with technology and threat advances, the accuracy and reliability of this plan decrease over the 30-year time horizon. As a hedge against this uncertainty, protecting the baseline acquisition profiles provides long-term foundational stability for thoughtful, agile modernization and a clearer forecast of when to evolve to the next ship design (1st shipbuilding priority). Aspects of the Navy's plan with the highest confidence in design and cost over the 30-year timeframe include ballistic missile submarines, attack submarines, amphibious ships, combat logistics ships, and aircraft carriers. The steady-state plan achieves 12 aircraft carriers beyond 2060, making it the last ship class to achieve its NNN requirement; options to accelerate are under review, including multi-ship procurements and reducing centers (years between procurements).

Surface combatant and attack submarine capabilities are the most dynamic and will likely evolve substantially to align with growing operational demands, availability of emerging technologies, introduction of unmanned and autonomous systems, and more capable sensors and payloads. Accordingly, the Navy will continue to analyze and update the Surface Capability Evolution Plan (SCEP), the Tactical Submarine Evolution Plan (TSEP), and all supporting plans (aviation, ordnance, etc.) for alignment of capabilities and appropriate NNN adjustments. This analysis is an enduring, responsive process that increasingly values agile and adaptable lethality against thinking, reactive adversaries. This approach naturally drives speed, lethality, stealth, information, and design margin for plug-and-play modernization as key attributes for future platforms – providing warfighting commanders composable capabilities in increasingly uncertain and contested environments across the spectrum of competition, up to full-scale conflict. The prioritized shipbuilding plan assigns the highest priority to these frontline combat platforms, affording the opportunity to quickly adopt new capabilities in response to emerging

disruptive capabilities – both ours and theirs – move to a new modernization effort, or move to a new platform design.

VII. Industrial Base

An efficient and supported industrial base is a fundamental requirement to achieving and sustaining the Navy's baseline acquisition profiles. Our shipbuilding industrial base and supporting vendor base constitute a national security imperative that is unique and that must be properly managed and protected. Over the previous five decades 14 defense-related new-construction shipyards have closed, 3 have left the defense industry, and one new shipyard has opened. Today, the Navy contracts primarily with 7 private new-construction shipyards to build our future Battle Force, representing significantly less capacity than our principal competitors. If faced with the demands of a major conflict it may be possible to engage other industries to assist, but the cost of such assistance is currently unquantifiable. The challenge of today's security environment portends agility and efficiency, and this prioritized plan takes an aggressive step in that direction.

For historical context, the "boom and bust" profiles of the last 60 years are shown in Appendix 4. These profiles show sharp peaks in shipbuilding, followed by significant breaks – valleys – in production that severely degraded the ability to plan for the long-term or respond in the near-term, devastated workforce experience and efficiency that is becoming increasingly more difficult to reconstitute, and contributed to significantly longer timelines to build ships with attendant significant cost growth. The steady, sustainable baseline shipbuilding profiles shown in figure A3-5 will establish industrial efficiency and agility, and protect workforce experience in order to remain competitive long-term.

Industry recognizes its critical role and has shown a strong desire to drive improved performance to meet Navy's needs. The Navy's role is to be a knowledgeable and demanding customer, to define the requirement, and to work with Congress to establish the foundational profiles to attain it. This should provide clarity and confidence that will inform industry investment in capital improvement and expansion, research and development, and a world-class workforce – the historically demonstrated key contributors to winning in any timeframe.

VIII. Summary

This 30-year shipbuilding plan is structured with a FYDP view of PB2019 funding levels carried forward. This plan is consistent with the Secretary of Defense's direction to focus PB2018 on improving warfighting readiness, and to focus PB2019 on the 2018 NDAA and National Defense Strategy priorities of growing capability and capacity.

The PB2019 NNN shipbuilding plan puts the Navy on a path to 326 ships by FY2023 and 355 ships by the early 2050s (NNN requirement for all ships except CVNs, which achieves 12 ships beyond 2060), assuming sufficient funding and execution of service life extensions. It is a realistic plan that reflects the imperative to remain balanced across the NNN priorities in an era of unpredictable and restrictive funding levels. The Navy realizes that a plan to achieve today's warfighting requirement in three decades represents an unacceptable pace in the context of the current and predicted security environment. Accordingly, a valuable feature of this plan is responsive scalability. By setting the conditions for an enduring industrial base as a top priority, we are postured to aggressively respond to more investment in any year, which if received in all years could attain the warfighting NNN target of 355 ships as early as the 2030s – balanced,

credible and sustainable – by leveraging all available tools for growing the force. In conjunction with pursuing required long-term, predictable funding, and in concert with the Secretary of Navy's business reform initiatives, the Navy continues to aggressively pursue acquisition strategies to build ships more quickly and more affordably.

Appendix 1

Difference between the 2014 Force Structure Assessment and he 2016 Navy the Nation Needs (NNN)

Table A1-1 shows the results of the 2016 NNN – an objective force of 355 Battle Force ships – relative to the 2014 FSA update.

Table A1-1. 2016 Navy the Nation Needs

Type / Class	2014 FSA	2016 NNN
Ballistic Missile Submarines[1]	12	12
Aircraft Carriers[2]	11	12
Attack Submarines	48	66
Guided Missile Submarines[3]	0	0
Large, Multi-Mission, Surface Combatants	88	104
Small, Multi-Role, Surface Combatants	52	52
Amphibious Warfare Ships	34	38
Combat Logistics Force	29	32
Command and Support	34	39
Total	**308**	**355**

The Navy will continue to analyze and evolve the architecture of the NNN in response to new capabilities, and evolution and expansion of the threat. This is an enduring, responsive process that values agility and plug-and-play adaptability, both in our platforms and the industrial base that builds them. The prioritized shipbuilding plan affords the opportunity to quickly adopt new capabilities in response to emerging, disruptive capabilities – both ours and theirs – move to a new modernization effort, or move to a new platform design.

[1] Replace the 14 Ohio-class SSBNs with 12 new Columbia-class SSBNs starting in the late 2020s. Operational availability will be comparable.

[2] The current profile will achieve the NNN requirement of 12 ships beyond 2060; options to accelerate are under review including multi-ship procurements and reducing procurement centers.

[3] The 4 SSGNs now in service retire in the mid-2020s. To meet NNN submarine payload and Special Forces requirements when the 4 SSGNs retire, Navy is inserting Virginia Payload Modules (VPM) into Block V Virginia-class attack submarines beginning in FY2019. A payload-based large diameter submarine will follow VPM late in the plan in accordance with the Tactical Submarine Evolution Plan (TSEP), which features a fast, lethal next generation attack submarine and a large-diameter, next-generation payload-based submarine.

Appendix 2

PB19 Shipbuilding Plan (FY2019-FY2023)

Table A2-1 displays the DoN's President's Budget PB2019 (FYDP) shipbuilding plan.

Table A2-1. FY2019-2023 New Construction Shipbuilding Procurement and Funding Plan (TY$M)

	FY19		FY20		FY21		FY22		FY23		FYDP	
Ship Type ($M)	**$**	**Qty**	**$**	**Qty**	**$**	**Qty**	**$**	**Qty**	**$**	**Qty**	**$**	**Qty**
CVN 78[1]	1,598		2,147		3,240		2,911		3,378	1	13,274	1
DDG 51	5,645	3	3,777	2	5,146	3	5,197	3	5,326	3	25,091	14
LCS[2]	646	1									646	1
FFG(X)[3,4]			1,191	1	843	1	1,750	2	1,792	2	5,576	6
SSN 774[5]	7,170	2	7,150	2	6,476	2	6,004	2	6,126	2	32,926	10
SSBN 826[6]	3,005		1,453		4,215	1	4,198		3,876		16,747	1
LX(R)			1,838	1			1,704	1	1,739	1	5,281	3
LHA(R)[7]									192		192	
ESB	650	1	650	1							1,300	2
T-AO 205	1,052	2	536	1	1,035	2	523	1	1,103	2	4,249	8
T-ATS(X)	80	1	153	2	74	1	75	1	77	1	459	6
T-AGOS (X)							344	1	369	1	713	2
Total New Construction[8]	**19,846**	**10**	**18,895**	**10**	**21,029**	**10**	**22,706**	**11**	**23,978**	**13**	**106,454**	**54**

Notes:

1. Funding for the CVN 78- class program reflects 6-yrs incremental funding authorized in the 2013 NDAA.
2. Funding does not include LCS mission modules, which are funded in Other Procurement, Navy (OPN).
3. FFG cost estimates are placeholders and do not reflect the approved threshold and objective cost levels that will be further refined in Conceptual Design phase.
4. New ships planned for future procurement or for replacement of legacy ships are annotated with (X) until their class has been named, such as FFG(X) and T-ATS(X).
5. Includes first VPM in FY2019, and then on each SSN thereafter.
6. FY2021 represents incremental funding for the lead ship: FY2021=41% ($3.6B), FY2022=35% ($3.1B), FY2023=24% (2.1B).
7. Advance procurement funding for LHA 9 in FY2023.
8. Funding for Total Ownership Cost (personnel, training, infrastructure, etc.) is in addition to funding for shipbuilding. TOC is phased with delivery of Battle Force ships within the FYDP.

FYDP highlights of the PB2019 budget submission include:

- First year of full funding for the fourth Ford-class aircraft carrier CVN 81 in FY2023.
- The addition of four DDG 51 Flight III ships (three more ships added to the previous FY18 to FY22 multi-year procurement (MYP)).
- Procurement of one LCS platform in FY2019 and transition to the frigate design beginning in FY2020.
- Procurement of the lead Columbia-class SSBN in FY2021.
- Continuation of two per year Virginia-class submarines ten-ship MYP from FY2019-2023.

- The planned procurement of the lead LX(R) in FY2020 with serial production starting with the second ship in FY2022.
- Continued serial production of the fleet oiler replacement with the T-AO 205 class with additional ships added in FY2019, FY2021 and FY2023, additional T-ESBs in FY2019 and FY2020, continued serial production of the T-ATS(X) ships and the planned procurement of the T-AGOS(X) ships beginning in FY2022.

Appendix 3

Long-Range Naval Vessel Inventory

Summarizing from paragraph VI of the main report, the central theme is a balanced warfighting investment portfolio across the six pillars of the *Navy the Nation Needs (NNN)* – Readiness, Capability, Capacity, Manning, Networks, and Operating Concepts. Accordingly, the enduring three elements of the shipbuilding plan, in priority order, are:

(1) Steady, sustainable growth (SG). Establish baseline acquisition profiles that grow a modern, adaptable force at a sustainable, affordable rate. As a result of the resources added to PB2019, baseline acquisition profiles were established within the overall warfighting balance.

(2) Aggressive growth (AG). More quickly attains the same balanced warfighting requirement as industrial capacity and increased resources permit, building upon the foundation of steady growth above. This is the demarcation between a profile that must be sustained (steady growth) and a profile that can be attained (aggressive growth). Aggressive growth options funded in PB2019 submission included seven ships above the baseline stable growth profile; one additional destroyer (DDG), one acoustic surveillance ship (T-AGOS(X), one Fleet Tug (T-ATS(X)), one Expeditionary Sea Base (ESB), and three Fleet Oilers (T-AO 205).

(3) Service Life Extensions (SLE). Pursue SLEs to sustain force structure and to extend the return on investment of qualifying candidates. All SLE candidates meeting evaluation criteria were funded in the PB2019 FYDP submission, which included six Ticonderoga Class cruisers, four Mine Countermeasures ships, and the first of five Improved Los Angeles class attack submarines.

Tables A3-1 thru A3-4 depicts the Long-Range Vessel Construction and Delivery Plan assuming steady, sustainable procurement. This plan results in the annual Naval Battle Force inventory shown in Table A3-4, which depicts the projected number of ships in service on the last day of each fiscal year. This plan addresses the Navy's most critical shipbuilding needs:

- Building CVNs four years apart (4-year center) instead of five, after CVN 82. This profile achieves NNN requirement of 12 CVNs beyond 2060; options are under review to accelerate, including multi-ship procurements and reducing centers.
- Building 12 Columbia-class SSBNs in support of the Nuclear Posture Review (NPR) and STRATCOM deterrence requirements.
- Establishing a stable profile of 2 per year Attack Submarines (SSN).
- Establishing a stable profile of 2.5 per year Large Surface Combatants (DDG), plus an additional ship in FY2022.
- Establishing a stable profile of 2 per year Small Surface Combatants (LCS, FFG) starting in FY2022, accommodating the transition to FFG(X).
- Increasing the pace for amphibious ship production to support a 12-ship LHD/LHA force and modernized lethality in FY2033, FY2036 and FY2039.
- Addresses the candidate long-term replacement for the NNN payload-based submarine, filled mid-term by Virginia Payload Module (VPM).

Table A3-1. Long-Range Naval Battle Force Construction Plan

Fiscal Year	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Aircraft Carrier					1					1				1				1				1				1				1
Large Surface Combatant	3	2	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2
Small Surface Combatant	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Attack Submarines	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Large Payload Submarines																		1			1			1			1			1
Ballistic Missile Submarines			1			1		1	1	1	1	1	1	1	1	1	1													
Amphibious Warfare Ships		1		1	1	2	1	1	2	1	1	1	2	1	1	1				1		1	1	1		1	2	1	1	2
Combat Logistics Force	2	1	2	1	2	1	1	1	1	1	1	1	1	1	1										1		2	2	2	2
Support Vessels	2	3	1	2	2	1	2	2	1	1	1	2	2	2	2	2	1													
Total New Construction Plan	10	10	10	11	13	11	11	11	12	11	11	11	13	12	12	10	9	8	7	7	8	8	8	8	8	8	12	9	10	12

Table A3-2. Naval Battle Force Delivery Plan

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Aircraft Carrier			1					1					1					1				1				1				
Large Surface Combatant	3	3	1	2	5	3	2	3	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	3
Small Surface Combatant	3	3	1	4	1		1	2	2	2	2	2	2	2	2	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2
Attack Submarines	3	2	2	2	1	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Large Payload Submarines																								1			1			
Ballistic Missile Submarines									1			1		1	1	1	1	1	1	1	1	1	1							
Amphibious Warfare Ships		1		1	1		1		1	2	1	1	1	2	1	1	2	1	1	2				1		1	2		1	1
Combat Logistics Force		3	2	1	2	1	2	1	1	1	1	1	1	1	1	1											1	2	2	2
Support Vessels	2	2	3	2	1	2	1	1	1	2	2	1	1	2	2	2	2	1		2										
Total Naval Force Deliveries	11	14	10	12	11	8	9	10	11	13	11	10	11	12	12	13	13	10	9	11	8	8	8	8	7	8	11	8	10	10

Table A3-3. Naval Battle Force Retirement Plan

Fiscal Year	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Aircraft Carrier							-1		-1					-1					-1			-1		-1				-1		-1
Large Surface Combatant						-2	-4	-4	-3	-4	-4	-5	-6	-4	-3	-4	-4	-2	-1			-2	-2	-4	-3	-4	-3	-4	-2	-2
Small Surface Combatant				-3		-8									-1		-1		-1	-1		-1	-3	-3	-5	-4	-3	-3	-1	-4
Attack Submarines	-1	-2	-3	-2	-3	-4	-4	-3	-3	-4	-1	-1		-1						-2	-1	-2	-2		-2	-1	-1	-1	-1	-1
Cruise Missile Submarines								-2	-1	-1																				
Ballistic Missile Submarines									-1	-1	-1	-1	-1		-1	-1	-1	-1	-2	-1	-1	-1								
Amphibious Warfare Ships									-1		-2	-1	-1	-1		-3	-3	-1	-1	-1		-1		-1	-1		-1	-1	-2	-1
Combat Logistics Force			-2	-1	-1	-1	-1	-2	-1	-1	-1	-2		-1	-1	-1	-1											-1	-2	-2
Support Vessels			-3			-1	-1	-1		-1	-2	-2	-2		-2	-2	-1	-2	-1	-2	-3	-1								
Total Naval Force Retirements	-1	-2	-8	-6	-4	-16	-11	-12	-11	-12	-11	-12	-10	-8	-8	-11	-11	-6	-7	-7	-5	-9	-7	-9	-11	-9	-8	-11	-8	-11

Table A3-4. Naval Battle Force Inventory

Fiscal Year	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Aircraft Carrier	11	11	11	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	10	11	10	10	10	11	10	10	9
Large Surface Combatant	92	95	98	99	101	104	103	101	101	100	99	97	93	92	91	90	88	89	90	93	95	96	96	95	94	93	92	91	91	92
Small Surface Combatant	31	34	37	35	39	32	32	33	35	37	39	41	43	45	46	48	51	54	55	56	58	59	58	57	54	52	51	50	51	49
Attack Submarines	52	53	52	52	51	48	46	45	44	42	44	45	47	48	50	52	54	56	58	58	59	59	59	61	61	62	63	64	65	66
SSGNs/Large Payload Submarines	4	4	4	4	4	4	4	2	1																1	1	1	2	2	2
Ballistic Missile Submarines	14	14	14	14	14	14	14	14	13	13	12	11	11	11	11	11	11	11	10	10	10	10	11	12	12	12	12	12	12	12
Amphibious Warfare Ships	33	33	34	34	35	36	36	37	36	37	37	37	37	37	39	37	35	36	36	36	38	37	37	36	36	36	36	37	35	35
Combat Logistics Force	29	29	30	31	31	32	32	32	32	32	32	31	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Support Vessels	33	35	34	37	39	39	40	40	41	41	41	41	40	41	41	41	42	42	42	40	39	38	38	38	38	38	38	38	38	38
Total Naval Force Inventory	299	308	314	318	326	321	318	315	314	313	315	314	314	317	321	322	324	331	334	336	342	341	342	341	338	336	336	336	336	335

The mid and far term periods beyond FY2024 become less precise, but provide a base from which to respond to changes due to development of future technology, candidate service life extensions, or threat-based fleet design and architecture decisions. This plan establishes a long term foundation in advance of the increasingly challenging security environment and reflects the continuation of the FYDP commitment to produce a 355 ship Navy with the correct mix of ships; a commitment that increasingly values speed, lethality, stealth, information, and design margin for modernization as key attributes for future platforms – providing warfighting commanders composable capabilities in increasingly contested environments across all phases of warfare.

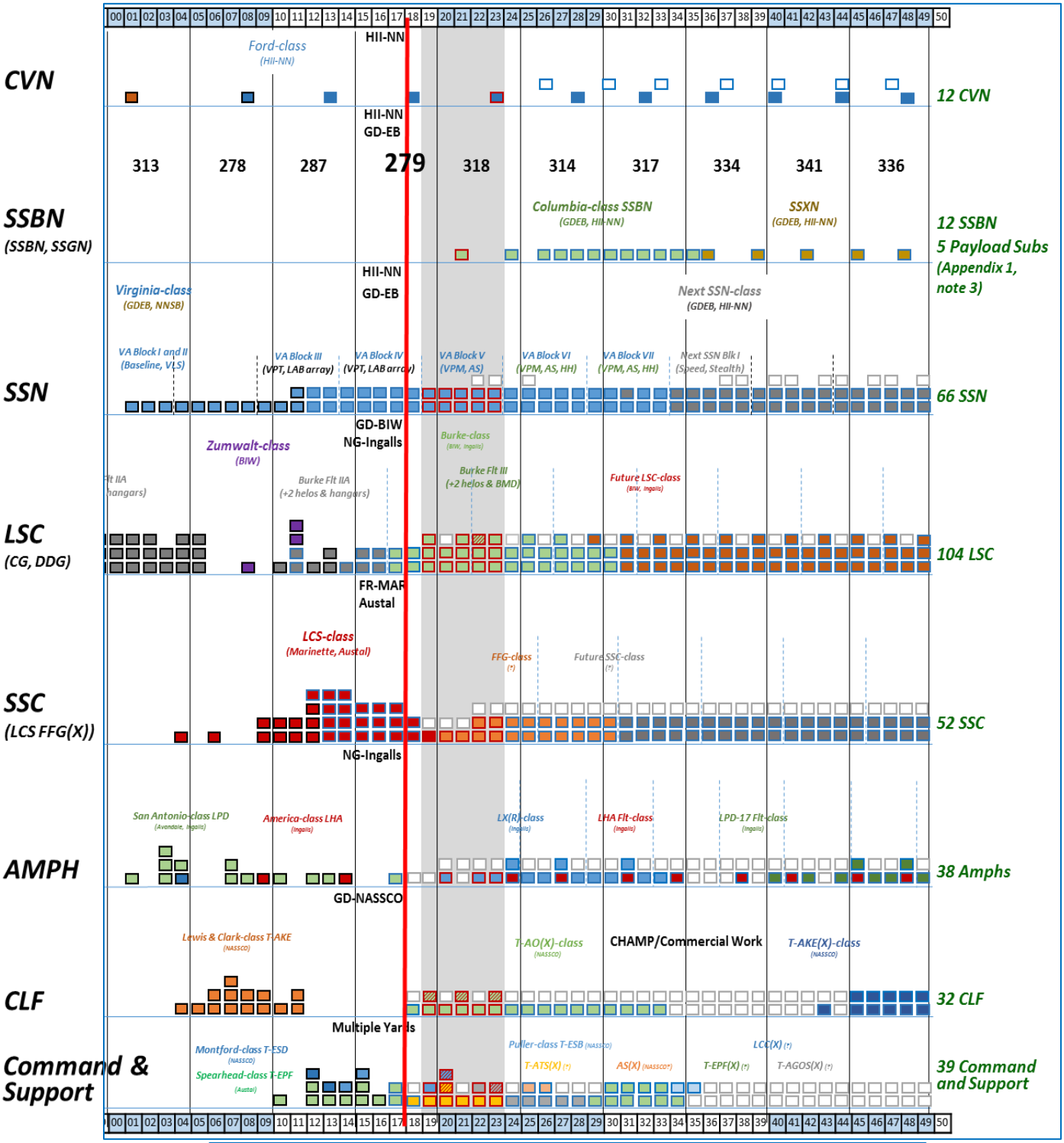
Aggressive Growth Opportunity

Although a plan to achieve today's warfighting requirement in three decades represents an unacceptable pace in context with worldwide evolving threats, it is a realistic plan that reflects the imperative to remain balanced across the NNN priorities in an era of unpredictable and restrictive funding levels. The most valuable feature of this plan is responsive scalability. By setting the conditions for an enduring industrial base as the top priority, the Navy is postured to respond to more aggressive investment in any year, which if received in all years could potentially attain the NNN warfighting target of 355 ships as early as the 2030s – balanced, credible and sustainable.

Figure A3-5 shows graphically the base 30-year plan featuring the steady shipbuilding profiles that must be sustained and properly managed. Of note, steady procurement profiles are most applicable to ship types with large requirements that demand continuous build rates to sustain force levels (SSN, LSC, SSC, etc.). These sustainment profiles are derived mathematically starting with the NNN requirement, divided by the notional ship life, to yield base procurements required per year to match steady-state retirements. These profiles will also grow the force until steady-state is achieved (the period of time that procurements exceed retirements). Classes such as CVNs attain a similar advantage by being procured on "centers" that balance stable shipyard workforce production and resources (the typical range is 3 to 5-yr centers). Ship classes such as Combat Logistics Force (CLF) and support ships, where the lower requirement results in excessive timeframes to achieve it using the math above, are procured to attain the requirement more quickly. The associated shipyard then moves to a different type of ship. This sector of the industrial base is more complex and carefully monitored, maintaining sustainment capacity with non-Battle Force ships or their own commercial ships. Accordingly, these profiles appear to be less stable.

The blocks with red borders in Figure A3-5 are those ships that are funded within the FYDP. Assessed extra industrial capacity is depicted by the white blocks layered in above the base plan. In the PB2019 FYDP, seven of these white blocks were filled in under "aggressive growth" and are depicted by red-hashed blocks. Left unchecked, more aggressive build rates (e.g. filling in more white blocks) can cause the total force level to temporarily exceed, or "overshoot" the requirement, and cause a "boom" shipbuilding period that would have to be properly managed by sustaining some level of follow-on base profiles to mitigate the subsequent "bust." Managing production to limit "overshoot" and avoid another boom and bust pattern will be important for stabilizing the industrial base long-term and preserving the desired efficiency and flexibility. In Figure A3-6 we attempt to show a range of profiles – admittedly simplifications – that endeavors to balance several competing variables that become better defined as we move down the timeline. The impact of "boom and bust" cycles is further addressed in Appendix 4.

Figure A3-5. Stable Procurement Profile
(Each block indicates individual ship procurement)



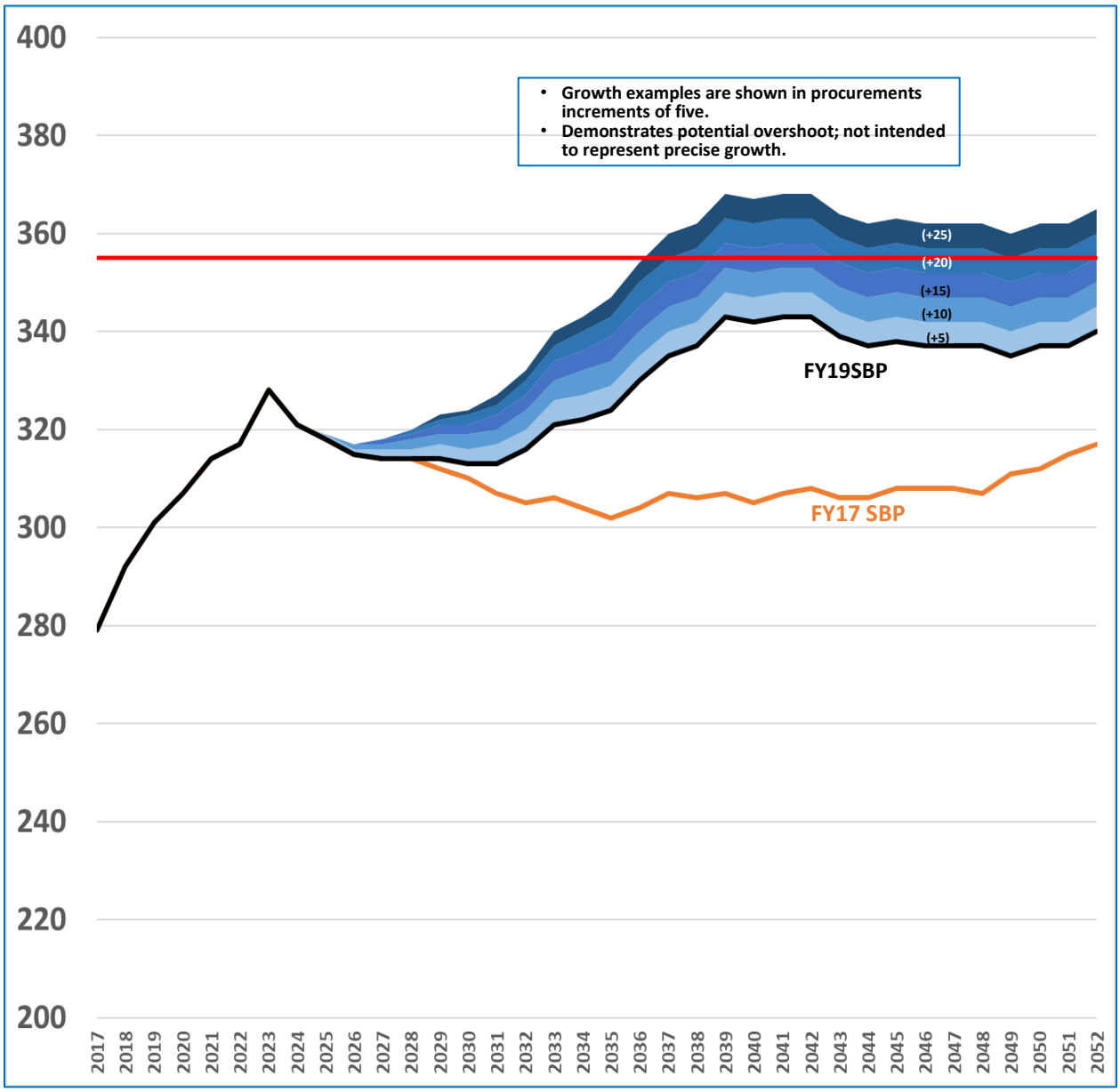
= Steady State Navy the Nation Needs (NNN) requirement
= Funded in PB19 to attain steady profile – red border
= Funded in PB19 above steady profile (aggressive growth) – hashed with red border
= Available shipyard capacity for additional aggressive growth
= 3.5-yr. CVN centers alternate profile. Accelerates achieving 12 ships to 2053.
= ship count; fielded minus inactivation middle of 5yr block

54 total FYDP ships added in PB19 submission (+11 above PB18)

Figure A3-6. Illustrating how different build rates can temporarily exceed requirements.

Aggressive Ramp Effect ("boom" period)

- FY19 shipbuilding plan (FY19SBP) reaches 355 in early 2050s, addressing inventory dips with SLEs and aggressive growth options, depending on growth factors (funding, capacity, etc.).
- Shows additional procurements in increments of +5, up to assessed max industrial capacity.
- LHA, LXR, DDG, SSN, and FFG must be balanced to keep correct warfighting mix.
- +20 additional procurements achieves 355 ships in the 2030s with significant overshoot (if procurement continues at the steady-state level following reaching the requirement).
- Less overshoot if production returns to a level below steady-state (potential "bust" period).



Appendix 4

Shipbuilding Industrial Base & the Boom/Bust Impact

The U.S. shipbuilding industrial base is unique and must be properly sustained. Over the previous five decades 14 defense-related new construction shipyards have closed, 3 have left the defense industry, and one new shipyard has opened. Today, the Navy contracts primarily with 7 private new construction shipyards to build our future Battle Force, which represents significantly less capacity than our principal competitors (figure A4-1). More recently, the impact of reduced Navy funding caused a parallel contraction of the sub-vendor sector and created an overall investment imbalance that favored limited shipbuilding over readiness, resulting in lapses in maintenance and operational proficiency. If faced with the demands of a major conflict it may be possible to engage other industries to assist, but the cost of such assistance is currently unquantifiable.

For historical context, the "boom and bust" profile of the last 60 years are shown in Figure A4-2. This profile shows sharp peaks in shipbuilding, followed by significant breaks – valleys – in production that severely degraded the ability to plan the long-term or respond in the near-term, devastated workforce experience and efficiency that is becoming increasingly more difficult to reconstitute, and contributed to significantly longer times to build ships with attendant significant cost growth. The significant buildup in the 1950s and 1980s, followed by "bust" periods of little production, led to significant instability and the loss of portions of our shipbuilding industrial base. The "boom" periods also eventually led to large-scale block obsolescence as types/classes of ships reached (or will reach) the end of their service lives simultaneously, ultimately driving the need for another "boom" to recover. Without a commitment to steady acquisition profiles, the now smaller industrial base will struggle to recover from future "boom/bust" cycles.

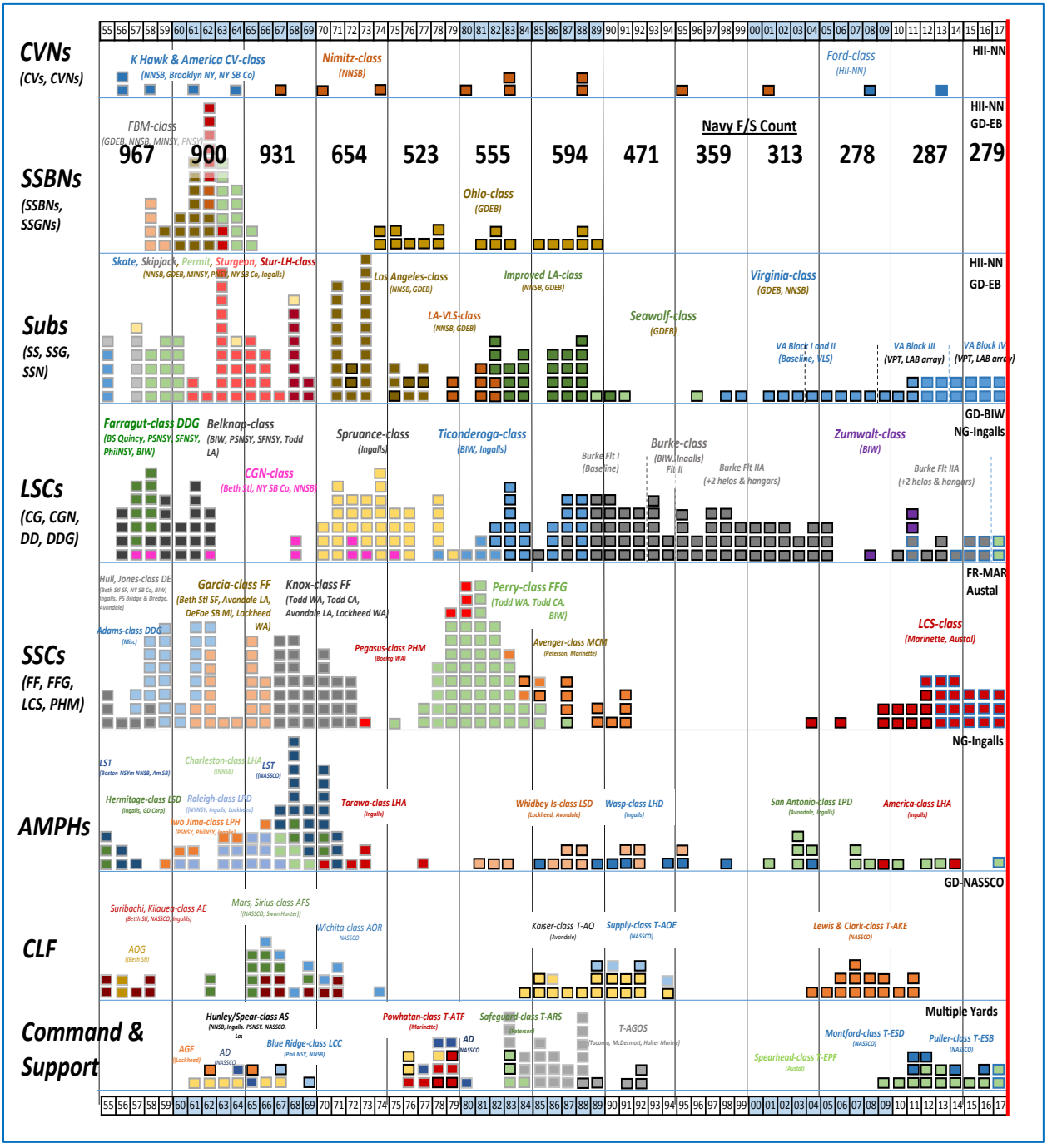
In contrast, the stable, affordable baseline shipbuilding profiles that must be protected to preserve our industrial base and establish an aggressive, forward looking, competitive posture are shown in Appendix 3. These baseline profiles feature a stable workforce to aggressively respond to NNN shipbuilding priorities, affording the opportunity to quickly adopt new capabilities, aggressively add capacity, plan and complete major modernization efforts, respond to emerging disruptive capabilities, or move to new platform designs.

Industry recognizes its critical role and has shown a strong desire to drive improved performance to meet Navy's needs. The Navy's role is to be a knowledgeable and demanding customer, to define the requirement, and to work with Congress to establish the foundational profiles to attain it. This should provide clarity and confidence that will inform industry investment in capital improvement and expansion, research and development, and a world-class workforce – the historically demonstrated key contributors to winning in any timeframe.

Figure A4-1. New Construction Industrial Base Reductions

Note: Other commercial shipyards may be future defense industry candidates.

Figure A4-2. Industrial Base Boom and Bust Cycles from 1955 to present.
(Each block indicates an individual ship procurement)



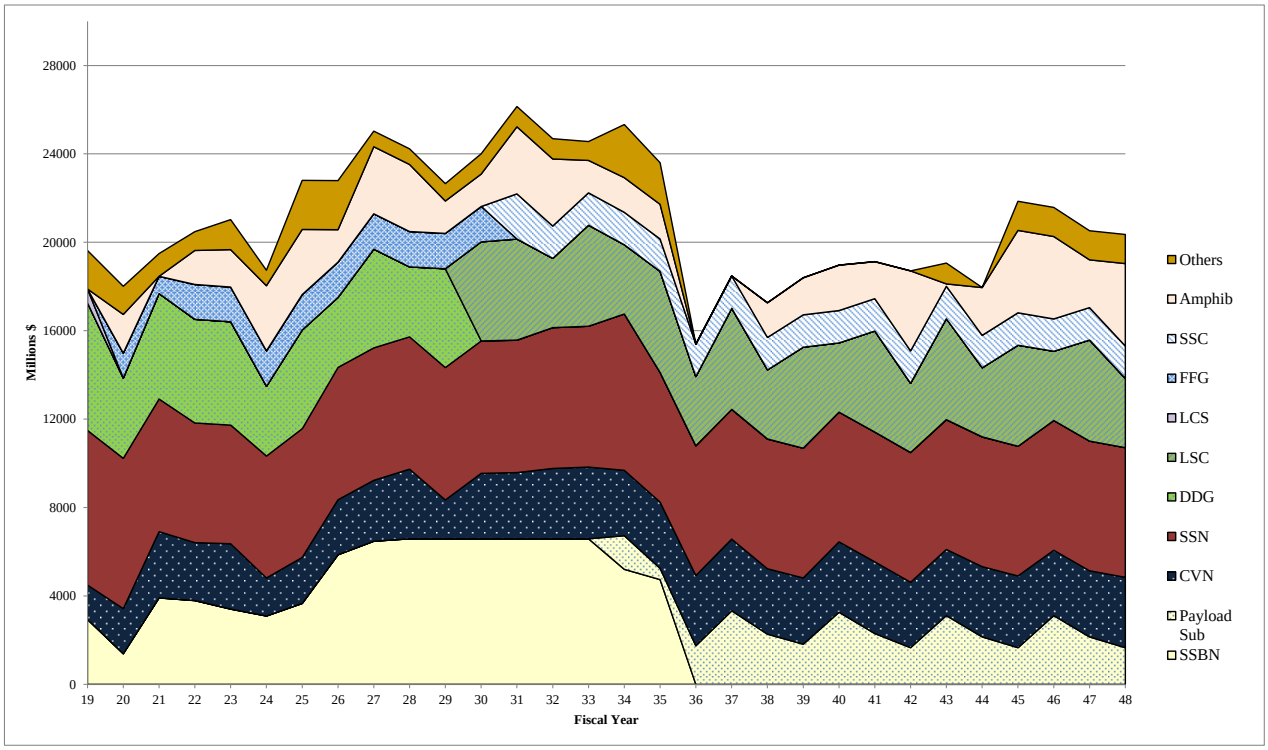
Appendix 5

Estimated Annual Ship Construction Funding Required for the Long-Range Shipbuilding Program

The funding in this report is in FY18 constant dollars using a 3.1 percent shipbuilding composite inflation rate (SCIR).[1] Figure A5-1 depicts the estimated funding required to achieve the inventories presented in Appendix 3, Table A3-4. Average ship construction funding across the FYDP is $19.7B per year. Beyond the FYDP, an average of $25B per year would be required to sustain the baseline stable acquisition profiles (shipbuilding priority #1), and also account for the serial production of the COLUMBIA Class SSBN. Exercising scalable "Aggressive Growth" options to take advantage of additional available industrial base capacity would come after that and would require additional ship-building funding. With a diligent approach to SLEs, strong industry response, and additional resources, 355 ships could be attained by the 2030s.

Total Ownership Cost (TOC) funding of sustaining a larger navy is in addition to shipbuilding funding, and phased with delivery of Battle Force ships (manning, support, training, infrastructure, etc.). TOC is included in the supporting accounts for anticipated FYDP deliveries.

Figure A5-1. Annual Funding Required for Navy Long-Range Shipbuilding Plan (FY2019-2048)



As required by the FY2016 NDAA, the graphical and tabular form of Figure A5-1, by ship class, is contained in a separate, limited distribution addendum to this report due to the business sensitive nature of the details.

[1] The shipbuilding composite inflation rate is a weighted average of shipbuilding costs across the shipbuilding industrial base. This inflation rate is developed using historic shipbuilding costs and projected future pricing for each shipyard. While historically it has been up to three percentage points higher than general inflation, this gap is projected to narrow to less than one percentage in the future.

Appendix 6

Planned Ship Decommissionings, Dismantlings, and Disposals during FY2019-FY2023 Future Years Defense Program (FYDP)

I. Introduction

This addendum report is in compliance with the Senate Armed Services Committee request for additional information regarding decommissioning and disposal of naval vessels.

II. Ships Planned for Decommissioning or to be Placed Out of Service during the FYDP

Table A6-l lists the Navy Battle Force ships to be decommissioned or placed out of service within the FYDP. The table also identifies the planned disposition for each ship. There are no potential gaps in warfighting capability that will result from the projected ships being removed from service.

Table A6-1. Ships Planned for Decommissioning or to be Placed Out of Service[1] during the FYDP

Inactivation Year (FY)	Ship Name	Disposition
2019 - 1 ship	USS PITTSBURGH (SSN 720)	Dismantle
2020 - 2 ships	USS OLYMPIA (SSN 717)	Dismantle
	USS LOUISVILLE (SSN 724)	Dismantle
2021 - 8 ships	USNS CATAWBA (T-ATF 168)	Dismantle
	USNS SIOUX (T-ATF 171)	Dismantle
	USNS APACHE (T-ATF 172)	Dismantle
	USNS WALTER S DIEHL (T-AO 193)	Dismantle
	USS PROVIDENCE (SSN 719)	Dismantle
	USS OKLAHOMA CITY (SSN 723)	Dismantle
	USS HELENA (SSN 725)	Dismantle
	USNS JOHN LENTHALL (T-AO 189)	Dismantle
2022 – 6 ships	USNS LEROY GRUMMAN (T-AO 195)	Dismantle
	USS CHAMPION (MCM 4)	Dismantle
	USS SCOUT (MCM 8)	Dismantle
	USS ARDENT (MCM 12)	Dismantle
	USS SAN JUAN (SSN 751)	Dismantle
	USS KEY WEST (SSN 722)	Dismantle
2023 – 4 ships	USNS PECOS (T-AO 197)	Dismantle
	USS ALBANY (SSN 753)	Dismantle
	USS PASADENA (SSN 752)	Dismantle
	USS CHICAGO (SSN 721)	Dismantle

Notes:
1. For the purposes of the report US Navy vessels are commissioned ships that are decommissioned and removed from active status. USNS vessels are non-commissioned vessels that are placed out of service.

III. Ships Planned for Dismantling and Disposal during the FYDP

As a result of the annual Ship Disposition Review conducted February 8, 2017, the Navy

plans to retire 21 Battle Force ships to the inactive inventory during the FYDP and remove 45 ships from the inactive inventory, 38 for dismantlement and 7 for fleet training exercises. Table A6-2 list ships slated to be dismantled within the FYDP with specific dates to be determined. Table A6-3 lists the 7 ships for fleet exercises to support SINKEXs during Rim of the Pacific (RIMPAC) and Valiant Shield training exercises.

Included in the 38 ships identified for dismantlement are the five Austin-class LPDs that are no longer needed in reserve for amphibious lift requirements. These ships will be removed from retention and stricken due to the assessed prohibitive cost to reactivate. Their average age is 47 years.

Table A6-2. Ships Planned for Disposal by Dismantling

Ex-TICONDEROGA (CG 47)	Ex-HAYES (AG 195)
Ex-INDEPENDENCE (CV 62)	Ex-BARRY (DD 933)
Ex-UNDERWOOD (FFG 36)	Ex-NAVAJO (ATF 169)
Ex-NICHOLAS (FFG 47)	Ex-DOYLE (FFG 39)
Ex-SAMUEL B ROBERTS (FFG 58)	Ex-YORKTOWN (CG 48)
Ex-MOBILE (LKA 115)	Ex-CANON (PG 90)
Ex-CHARLESTON (LKA 113)	Ex-KITTY HAWK (CV 63)
Ex-EL PASO (LKA 117)	Ex-CHARLES F ADAMS (DDG 2)
Ex-BOONE (FFG 28)	Ex- PONCE (AFSB(I) 15)
Ex-JOHN L HALL (FFG 32)	USS CHAMPION (MCM 4)
Ex-STEPHEN W GROVES (FFG 29)	USS SCOUT (MCM 8)
Ex-HAWES (FFG 53)	USS ARDENT (MCM 12)
Ex-THOMAS S GATES (CG 51)	USNS CATAWBA (ATF 168)
Ex-JUNEAU (LPD 10)	USNS WALTER S DIEHL (T-AO 193)
Ex-CLEVELAND (LPD 7)	USNS JOHN LENTHALL (T-AO 189)
Ex-DUBUQUE (LPD 8)	USNS SIOUX (ATF 171)
Ex-DENVER (LPD 9)	USNS APACHE (ATF 172)
Ex-NASHVILLE (LPD 13)	USNS LEROY GRUMMAN (T-AO 195)
Ex-JOHN F KENNEDY (CV 67)	USNS PECOS (T-AO 197)

Table A6-3. Ships Planned for use in Future Fleet Training Exercises

Ex-MCCLUSKY (FFG 4 1)	Ex-FORD (FFG 54)
Ex-CURTS (F'FG 38)	Ex-INGRAHAM (FFG 61)
Ex-RACINE (LST 1191)	Ex-DURHAM (LKA 114)
Ex-ST LOUIS (LKA 1 16)	

Appendix 7

Auxiliary Vessel Plan

I. Introduction

The 2018 NDAA directed inclusion of an Auxiliary vessel recapitalization plan. Auxiliary vessels are defined as any ship designed to operate in the open ocean in a variety of sea states to provide general support to either combatant forces or shore based establishments. These ships support sealift requirements as documented in the DoD's most current mobility study. Auxiliaries do not meet the definition of a Battle Force ship, and are not included in the ship count.

II. Sealift Background

Auxiliaries support DoD's requirement to meet sealift needs around the world as evaluated in the Mobility Capabilities Assessment-2018 (MCA-18). This study identified the requirement for the sealift fleet to support a capacity of 15.3 million square feet. The current fleet includes:

- 50 Surge roll-on/roll-off (RO/RO) vessels (15 Military Sealift Command and 35 Maritime Administration Ready Reserve Force)
- 15 Prepositioning roll-on/roll-off vessels (10 Maritime Prepositioning Force (MPF) and 5 Army Prepositioning)
- 10 Special Capability ships (crane, aviation logistics, and heavy lift)

Table A7-1 below indicates the age of the fleet, with most reaching end of service life before FY2040. 20 of these ships have been funded for service life extensions (SLE).

A7-1. Sealift Retirement Schedule

	Avg Age	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
Crane (ACS)	50						1	2			2				1								6
Aviation Log (AVB)	48												1	1									2
Heavy Lift (SEABEE)	45													1	1								2
Surge Sealift (AK & AKR)	39								1	1	5		4	7	11	2	4	5	8			2	50
Total		0	0	0	0	0	1	2	1	1	7	0	5	9	13	2	4	5	8	0	0	2	60

III. Recapitalization

Maintaining sealift capacity levels over the next 30 years requires a mix of immediate and long-term actions. DON has developed a recapitalization strategy along with USTRANSCOM, MARAD, and other partners. The resulting strategy has three major elements:

- Service life extensions
- Acquiring used commercial vessels
- New-build construction at U.S. shipyards

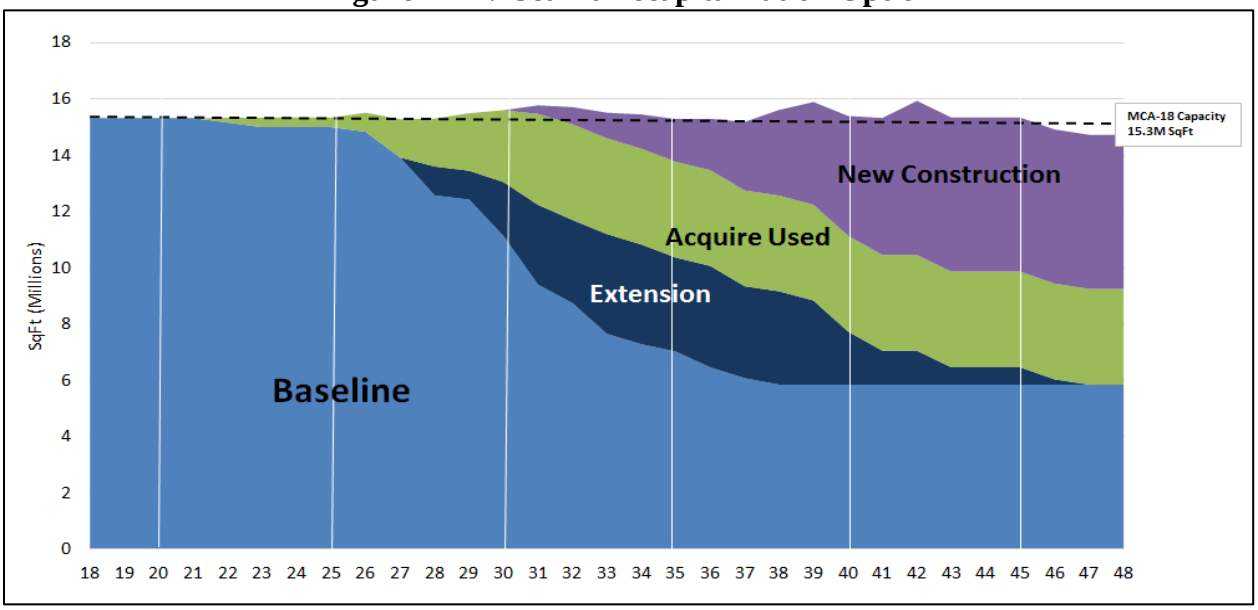
Service life extensions typically add approximately 10 years (from 50 years to 60 years). Extending service life is a short-term solution. Similar to the overall shipbuilding plan, maintaining

required levels of sealift relies upon a balanced combination of service life extension and acquiring new and used vessels.

Acquiring used commercial ships is the second element of maintaining sealift requirements. The 2018 NDAA authorizes procurement of two used vessels (the first will be in FY 21). Approximately 24 candidates have been identified, providing significant opportunity for growth in this area. DON will continue to work with Congress for authority to purchase more used vessels.

Finally, acquiring new ships is the ultimate long-term solution (50+ year ship life). Newly constructed vessels will be delivered first to the Maritime Prepositioning Force (MPF), strengthening the Fleet's ability to support employment across the full range of military operations. Replaced MPF vessels will in turn rotate into the sealift fleet, replacing older surge ships while sustaining capacity. Figure A7-2 shows a general plan for recapitalizing sealift capacity, measured in square feet.

Figure A7-2. Sealift Recapitalization Option



Profiles for new and used ships:

Fiscal Year	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	19-48
RO/RO New Construction										1		1	1	1	1	1	2	2	2	2	2	2									18
Used RO/RO Procurement			1	1			2	4	2	2	3	4	1																		20
Crane Ship Procurement						1	2			2			1																		6

IV. Funding: Funding is programmed in PB19 to begin the development of a common-hull program. Costs for the procurement of these ships will be provided when available.

Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020

Prepared by:

Office of the Chief of Naval Operations

Deputy Chief of Naval Operations (Warfare System Requirements - OPNAV N9)

2000 Navy Pentagon

Washington, DC 20350-2000

March 2019

The estimated cost of this report or study for the Department of Defense is approximately $313,000 in Fiscal Years 2018 - 2019. This includes $19,000 in expenses and $294,000 in DoD labor.

2019Mar05 RefID: 0-2672627

Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020

Table of Contents

Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year (FY) 2020

I. Reporting Requirement

This report is submitted per Section 231 of Title 10, United States Code. Appendices 1-8 provide supporting details. Appendix 8 is controlled under limited distribution.

II. Submission of the Report

This report is the Department of the Navy's (DoN) 30-year shipbuilding plan for FY2020-FY2049. The FY2020 President's Budget (PB2020) provides planned funding to procure the ships included in the FY2020-FY2024 Future Years Defense Program (FYDP). Per the FY2019 National Defense Authorization Act (NDAA), the estimated operations and sustainment costs required to support the vessels delivered under the shipbuilding plan are included in Appendix 5. Unless otherwise noted, funding levels are shown in constant year (CY) FY2019 dollars.

III. Key Themes in this Report

The *National Defense Strategy* and the *Navy Strategy* provide the overarching high-level requirements for the *Navy the Nation Needs*, the Navy's enduring plan for building and sustaining a lethal, resilient force through balanced investments across readiness, capability, and capacity. This 30-year shipbuilding plan is the foundation of the Navy's future, with the following highlights:

- Continues the driving themes of adaptability, agility, and efficiency in both the ships and the industrial base that builds them, while pursuing the Secretary of the Navy's reform initiatives across a number of measurable process improvements in acquisition and program execution.

- Acts on the FY2018 NDAA supporting the Navy's validated minimum requirement of the correct mix of 355 battle force ships, and the FY2019 NDAA direction to include estimated sustainment costs for a larger fleet within the context of a balanced investment plan.

- Demonstrates the powerful combined impact of predictable shipbuilding profiles and stable, on-time funding (absent a continuing resolution), and portends the potential damaging impact of Budget Control Act sequestration on the future success of this plan.

- Includes procurement of 55 battle force ships within the FYDP and rebalances service life extensions (SLE) to produce a steady ramp to the aggregate goal of 355 approximately 20 years sooner than last year's plan. This steady profile provides a predictable forecast for supporting acquisition programs and reform efforts in shipbuilding, maintenance, and personnel management.

- Includes $4B in savings (18%) through a negotiated two-ship aircraft carrier procurement plan and removes one aircraft carrier refueling overhaul – the combined savings supports pursuing balanced investments in next generation capabilities.

- Captures the fiscal challenge of sustaining the shipbuilding plan while introducing serial production of the new *Columbia*-class SSBN.

- Discusses commercial shipbuilding challenges regarding recapitalizing the auxiliary fleet in support of the employment concept of Distributed Maritime Operations (DMO).

IV. Force Structure Assessment and Fleet Architecture

Force Structure Assessments (FSA) are conducted in response to shifts in the threat analysis, changes in strategic guidance and/or operational concepts, and are typically conducted every few years. Because of the timeframes for designing and building ships, the long-term focus and periodicity of the FSA aligns well with industry's ability to respond. For this year's shipbuilding plan, the 2016 FSA remains the base requirement for the correct mix of 355 battle force ships.

In response to the latest *National Defense Strategy*, *Navy Strategy* and *CNO's Design for Maintaining Maritime Superiority 2.0*, the Navy is on track to complete the next FSA by the end of 2019. Some of the key elements that will be reviewed include ongoing threat-based fleet architecture review, logistics in support of DMO, surface ship mix with the inclusion of the new frigate, deterrence per the *National Defense Strategy*, and legacy capital investments versus the efficacy of next generation capabilities.

The battle force detailed in the 2016 FSA is based upon war plan analysis and acceptable levels of strategic and operational risk in the context of complex Navy responsibilities. In addition to the 2016 FSA, and as directed by the FY2016 NDAA, Navy sponsored three independent studies of alternative future fleet architectures. The results of all sponsored studies and assessments, along with insights gained from ongoing war games and advanced capability development efforts, converged on the need for a substantially larger Navy. These results ultimately informed the FY2018 NDAA legislation that established the correct mix of 355 battle force ships as the minimum requirement.

V. Unmanned Systems

Unmanned systems continue to advance in capability and are anticipated to become key enablers through all phases of warfare and in all warfare domains. Significant resources were added during PB2020 to accelerate fielding the full spectrum of unmanned and optionally-manned capabilities, including man-machine teaming ahead of full autonomy. These systems are now included in wargames, exercises and limited real-world operations. They are funded in the Navy's research and development investments and accounted for in detail in each warfare domain's Capability Evolution Plan (CEP).

Unmanned and optionally-manned system are not accounted for in the overall battle force as defined by the Secretary of the Navy on behalf of Congress. The physical challenges of extended operations at sea across the spectrum of competition and conflict, the concepts of operations for these platforms, and the policy challenges associated with employing deadly force from autonomous vehicles must be well understood prior to replacing accountable battle force ships. Accordingly, the Navy will continue to move quickly to assess the resultant naval power delivered by these systems, moving forward based on demonstrated, evidence-based capability.

Navy will continue to push aggressively to deliver these capabilities and evaluate progress, and will work closely with Congress as this develops.

VI. Plan Objectives – Balanced, Stable, Scalable

The *National Defense Strategy* articulates how the United States military will compete, deter and win with a more lethal, resilient, and rapidly innovating Joint Force. Operating in an increasingly complex security environment defined by rapid technological change in every

operating domain, the Navy continues to value adaptability and agility as a hedge against uncertainty. The *Navy Strategy* articulates the maritime implementation of the *National Defense Strategy* and includes the three driving elements of readiness, capability, and capacity, all of which must remain balanced and scalable in order to field credible naval power. A disciplined approach ensures force structure growth (capacity) accounts for commensurate, properly phased investments in readiness and capability.

The FY2020 shipbuilding plan is complemented by the reform initiatives included in the *2018 Shipyard Infrastructure Optimization Plan*, the *Long-Range Plan for the Maintenance and Modernization of Naval Vessels*, the *Sealift that the Nation Needs,* and Navy processes to improve the efficiency of operations and sustainment. The following framework defines the three enduring shipbuilding imperatives:

1st Imperative: Steady, Sustainable Growth. Sustains the minimum baseline acquisition profiles that grow the force at a steady, affordable rate while maintaining a balanced warfighting investment strategy. Of particular importance is sustaining the industrial base at a healthy level that supports affordable acquisition, predictable and efficient maintenance and modernization, and an appropriately sized workforce for more aggressive growth if additional resources become available. Steady profiles ensure there is enduring focus on the long-view.

2nd Imperative: Aggressive Growth. Accelerates production by taking advantage of available industrial capacity and additional resources, building upon the foundation of long-term steady growth if able to do so without threatening the overall balance of the warfighting investment plan – the upper boundary of what can be attained (aggressive growth) and what must be sustained (steady growth).

3rd Imperative: Service Life Extensions (SLE). SLEs provide valuable options for managing ship inventories, but must complement (not replace) the long-term growth profiles discussed above in order to have the desired positive effect on inventory objectives. There are two varieties of SLEs; class-wide SLEs based upon engineering analysis of performance metrics over time, and individual SLEs of specific ships nearing retirement. Class-wide extensions are more valuable for long-term planning, sustainment, and inventory management (filling in profile dips). Two notable examples of successful class-wide SLEs are the *Ohio*-class SSBN extension to 42-years and the recent *Arleigh Burke*-class DDG extension to 45-years.

SLE candidates are evaluated for basic hull, mechanical, and electrical restoration, their ability to be upgraded with current systems, anticipated additional life that could be gained, and return on investment vs. replacement or other capability investments. Reactivation of retired battle force ships is also considered under this imperative; however, due to their poor condition after a full service life, they typically do not provide meaningful return on investment.

VII. FY2020 Shipbuilding Plan Overview

Through the balanced application of the above shipbuilding imperatives, the timeframe for achieving the overall inventory was accelerated by approximately 20 years over last year's plan. Continual application of these imperatives, combined with Congressional support, on time funding, and strong industry response could yield additional opportunities for acceleration.

The PB2020 30-year shipbuilding plan includes procurement of 55 battle force ships within the FYDP. Overall inventory will reach 314 ships by FY2024 and 355 ships in FY2034. The DDG 51 class-wide extension was the principal driver of the 20-year acceleration and also

provided opportunity to address higher priority readiness challenges while adjusting profiles to achieve a steady, increasing ramp to 355 (removes FY2026-2031 inventory dip). Absent this dip, the aggregate profile now provides a more predictable forecast for fleet planners, shipbuilders and the numerous supporting acquisition programs and enabling contributors – maintainers, trainers, recruiters, etc. The mix of ships will be biased towards DDGs until reaching individual inventory objectives across all ship types, a timeline principally driven by SSNs and CVNs. Numerically, SSNs remain the furthest from the inventory objective and options are being explored regarding expanding production. While additional DDGs do not completely compensate for these other shortfalls, they do provide considerable lethality and utility while filling in the balance of the force mix. Inventory is capped at 355 beyond FY2034 to manage operating and sustainment costs while preserving the option to extend additional DDGs if needed, depending upon the security environment, overall shipbuilding plan dynamics, funding, or updated inventory requirements. In addition to the DDG extensions, the most notable adjustments from last year's plan include:

- Two-ship aircraft carrier procurement (CVN 80 and CVN 81), resulting in $4B in savings and the associated accounting shift of CVN 81 from FY2023 to FY2020. The *Ford* class represents Navy's enduring commitment to the aircraft carrier new-construction industrial base. Note: The 2-ship procurement strategy does not alter the delivery schedule.

- Retirement of CVN 75 in lieu of its previously funded Refueling Complex Overhaul (RCOH). This adjustment is in concert with the Defense Department's pursuit of a more lethal balance of high-end, survivable platforms (e.g. CVNs) and complementary capabilities from emerging technologies. Persistent threat analysis and ongoing warfighting studies will continue to inform the requirements for specific battle force ships in the context of an evolving capability force mix, and the Navy is postured to respond to these studies.

- Addition of a third SSN in FY2020, shifting one DDG from FY2021 to FY2020, and adding a second FFG(X) in FY2021. Note: Because it was added to the shipbuilding plan this year, advanced procurement was not programmed for the third FY2020 SSN. This will result in delivering it over a timeframe similar to a ship procured in FY2023. Per Congressional direction, the next SSN multi-year procurement contract will include options for a third submarine in FY2022 and FY2023, the years when not procuring an SSBN.

- LPD profile shift to balance shipbuilding accounts in support of near-term priorities articulated in the National Defense Strategy. Navy slid the LPD profile right and deferred the FY2024 procurement to beyond the FYDP. Note: In pursuing the NDS priorities, Navy was unable to take advantage of last year's addition of advanced procurement funding for either a FY2020 LPD or for an adjustment to the LHA profile, and will work with Congress on options for the next budget cycle.

- SLE adjustments that extend the entire DDG-51 class and refuels two *Los Angeles*-class attack submarines. Five additional SSN candidates were identified for SLE beyond the FYDP. The funding for SLEs of the six oldest cruisers, added in PB2019, was removed in PB2020 in favor of readiness and other lethality investments. The first two of these retirements were scheduled for FY2020, but deferred one year to support reevaluation during PB2021. Modernization of the newer cruisers under the Congressionally mandated 2-4-6 plan is still in progress.

- Accelerate retirement of mine countermeasure ships (MCMs). The Navy is focused on both future MCM capability and near-term improvement of operational availability (Ao) of the aging *Avenger*-class MCMs, with priority on the forward deployed naval force (FDNF). Accordingly, the homeland threat environment supports retiring the three remaining continental United States based MCM ships in FY2020 and harvesting parts that are no longer manufactured in order to improve FDNF Ao. In parallel, and in response to the growing complexity of sea-mines, Navy is moving to a broad-spectrum, cross-domain, expeditionary approach that includes dedicated LCS-based MCM ships, MCM modules for use aboard Vessels of Opportunity (VOO), small expeditionary MCM teams, and undersea vehicles. This approach is the central theme of the classified Mine Warfare Strategy that will be provided to Congress in 2019, certifying Navy's intent per the FY2018 NDAA for evolving the MCM force.

Appendix 1 summarizes the FSA requirement of the specific ship types that total 355 battle force ships, and also summarizes FYDP funding for ship construction (SCN – Shipbuilding and Conversion, Navy). Appendix 2 illustrates the 30-year acquisition, delivery and inventory profiles, and Appendix 3 discusses industrial base dynamics. Appendix 4 includes projected costs across the 30-year plan that shows an average of $20.3B per year for SCN across the FYDP and $26B to $28B per year beyond the FYDP to sustain this plan while introducing continuous production of the new *Columbia*-class SSBN, last recapitalized from FY1974 to FY1989. The fiscal impact of the new SSBN begins in FY2023 with advanced procurement, and then increases in FY2026 with full annual procurements. This represents Navy's largest fiscal challenge for near-term budgets and could impact the pace of procuring other ship types – potentially causing a drop below the steady profiles detailed in Appendix 2.

Following four decades of a progressively smaller Navy, Appendix 5 illuminates the cost of owning and operating a significantly larger Navy, and the associated challenge of modeling the complex forecasting variables. Consistent annual funding in the shipbuilding account is foundational to sustaining steady growth (capacity), but equally important is the properly phased, additional funding in operating and sustainment accounts as new ships are delivered – the much larger fiscal burden over time.

Appendix 6 addresses the ongoing plan for inactivation and disposal of naval ships. Appendix 7 discusses the growing logistics requirement in the context of DMO and illustrates opportunities being pursued to recapitalize the auxiliary fleet, a key enabler for sustaining protracted medical, logistics, repair, command and control, and support missions. Because of industry dynamics over time resulting in an atrophied U.S. commercial industrial base, close partnering with industry and Congress is needed to recover the U.S. commercial market in order to competitively and affordably address the Navy's auxiliary shipbuilding requirement. Appendix 8 contains proprietary costing data and is controlled under limited distribution.

As a hedge against uncertainty later in the shipbuilding plan, the baseline acquisition profiles (1st shipbuilding imperative) provide long-term foundational workforce stability for thoughtful, agile modernization and a clearer forecast of when to evolve to the next ship design. Surface combatants, including aircraft carriers, and attack submarines in particular must be built to support the adoption of evolving technologies. Accordingly, the Surface Capability Evolution Plan (SCEP) and the Tactical Submarine Evolution Plan (TSEP), plus supporting aviation and ordnance plans, are structured to drive alignment, reduce cost, and prevent missed opportunity. Because the speed of technology evolution in all domains continues to increase at an increasing rate, capability evolution as an enduring, responsive process places high value on adaptability

and commonality – building in features to quickly move to new technologies and capabilities. The new *Ford*-class aircraft carrier is a sterling example, providing nearly three times the electrical power, adaptable support systems for the future air wing, and significant margin for long-term modernization.

The next generation Large Surface Combatant (LSC) and attack submarine (SSN(X)) design concepts are both focusing on adaptability. The legacy platforms they will replace continue to serve us well, but have nearly exhausted their margins for modernization and require a broader spectrum of solutions. The LSC and SSN(X) will follow the FFG(X) model of partnering with industry early to define the art-of-possible, balance cost, and reduce risk ahead of requirements definition, and will include alternative platform concepts. The LSC is nearer-term and industry engagement over the next year will determine the feasibility of accelerating the effort in accordance with the imperatives of the *CNO's Design for Maintaining Maritime Superiority 2.0*.

VIII. Industrial Base

A healthy and efficient industrial base continues to be the fundamental driver for achieving and sustaining the Navy's baseline acquisition profiles. Our shipbuilding and supporting vendor base constitute a national security imperative that is unique and must be protected. To keep a clear eye on historical context, the "boom and bust" behavior discussed in detail in last year's shipbuilding plan is summarized in Appendix 3 and continues to provide insight into the power of a skilled workforce with career stability, especially in the face of today's competitive job market. We are at a level of fragility that without consistent and continuous commitment to steady acquisition profiles as proposed in this plan, the industrial base will continue to struggle and some elements may not survive another "boom/bust" cycle.

Discussed in the March 2018 report *Sealift That the Nation Needs* and in Appendix 7, recapitalizing the auxiliary fleet in support of DMO has become a top priority. Regrettably, the same factors that drove the investment imbalance across readiness–capability–capacity of the battle force also resulted in deferring timely reinvestment in the auxiliary and sealift fleets. In parallel, the commercial industry supporting our auxiliaries and sea-lift has atrophied due to the combined effect of increased foreign competition and U.S. legislation/policy.

For 2019, the Navy is also developing a *Long-Range Plan for the Maintenance and Modernization of Naval Vessels*. This plan captures the combined complexity of high-tempo operations, increasing fleet size, and a dynamic support base resulting in maintenance and readiness challenges. The plan will address end-to-end depot-level maintenance and modernization processes for various ship classes, examine the industrial base, and look ahead 30 years as the fleet grows.

The Navy's role is to partner with industry to define and establish workable requirements and to partner with Congress to sustain predictable profiles. These supportive relationships will continue to promote efficiency through capital improvement and expansion, research and development, and sustainment of a world-class workforce – the key contributors to winning in any timeframe.

IX. Summary

The 30-yr shipbuilding plan reflects the *National Defense Strategy* priority to build a more lethal force. Through the judicious application of predictable shipbuilding profiles and stable, on-time funding, the timeframe for achieving the overall inventory was accelerated by 20 years over last year's plan, providing a path to 314 ships by FY2024 and a steady ramp to 355 ships by the mid-2030s, with the inventory biased towards DDGs while filling in the rest of the force.

The dynamic threat environment continues to drive creative, adaptable capability development, new operational concepts, and alternative force structure composition. The shipbuilding plan realistically supports this dynamic environment and reflects the unwavering imperative to remain fiscally balanced. Accordingly, the plan's most valuable feature is scalability, and by setting the conditions for an enduring industrial base as a top priority the Navy is postured to more aggressively grow the force with additional resources, or to responsibly shrink the force with fewer resources, assuming the steady profiles are sustained.

The shipbuilding plan is structured using a FYDP view of PB2020 funding levels carried forward, and also provides enough fidelity beyond the FYDP to illuminate looming fiscal challenges both in procurement and operations and sustainment. In conjunction with pursuing required long-term, predictable funding, and in concert with the Secretary of Navy's business reform initiatives, the Navy continues to pursue a spectrum of acquisition strategies to build and operate ships more efficiently – steady resourcing is ultimately the most important factor.

Appendix 1

PB20 Shipbuilding Plan (FY2020-FY2024)

Table A1-1 shows the *Navy the Nation Needs* requirement, by ship type, based upon the 2016 Force Structure Assessment (FSA) and the FY2018 National Defense Authorization Act (NDAA). Table A1-2 includes the President's Budget (PB2020) funding for the Future Years Defense Program (FYDP) portion of the 30-yr shipbuilding plan.

Table A1-1. Navy the Nation Needs

Type	**2016 FSA[1]**
Ballistic Missile Submarines[2]	12
Aircraft Carriers[3]	12
Attack Submarines	66
Guided Missile Submarines[4]	0
Large Surface Combatants	104
Small Surface Combatants	52
Amphibious Warfare Ships	38
Combat Logistics Force	32
Command and Support	39
Total	**355**

Notes:

1. In response to the *National Defense Strategy*, *Navy Strategy* and *CNO's Design for Maintaining Maritime Superiority 2.0*, the Navy is on track to complete the next FSA by the end of 2019.
2. Replace 14 *Ohio*-class SSBNs with 12 *Columbia*-class SSBNs.
3. Similar to last year, the current profile will achieve the requirement of 12 ships beyond 2060.
4. The 4 SSGNs now in service retire in the mid-2020s. To meet payload and Special Forces requirements, Navy is inserting *Virginia* Payload Modules (VPM) into Block V and VI *Virginia*-class attack submarines beginning in FY2019. A payload-based large diameter submarine will follow VPM in accordance with the Tactical Submarine Evolution Plan (TSEP), a plan that features a fast, lethal next generation attack submarine and a large-diameter, next-generation payload-based submarine.

Table A1-2 PB2020 FYDP funding for Ship Building and Conversion Navy (SCN)

	FY20		FY21		FY22		FY23		FY24		FYDP	
Ship Type ($M)	**$**	**Qty**	**$**	**Qty**	**$**	**Qty**	**$**	**Qty**	**$**	**Qty**	**$**	**Qty**
CVN 78[1]	2,347	1	2,645		2,324		1,929		1,718		10,962	1
DDG 51	5,323	3	3,464	2	3,578	2	6,160	3	5,649	3	24,174	13
FFG(X) [2,3]	1,281	1	2,057	2	1,750	2	1,792	2	1,828	2	8,709	9
SSN 774	9,926	3	6,123	2	5,968	2	6,081	2	7,052	2	35,150	11
SSBN 826[4]	1,699		3,921	1	4,196		3,872		4,790	1	18,477	2
LPD Flt II	247		1,591	1			1,739	1			3,577	2
LHA(R)[5]							171		1,618	1	1,788	1
ESB					127		549	1			676	1
T-AO 205	1,054	2	513	1	522	1	1,101	2	559	1	3,749	7
T-ATS(X)	150	2	78	1	79	1	81	1			388	5
T-AGOS (X)					343	1	369	1	302	1	1,014	3
Total New Construction[6]	**22,028**	**12**	**20,392**	**10**	**18,887**	**9**	**23,843**	**13**	**23,516**	**11**	**108,665**	**55**

Notes:

1. Funding reflects the two-CVN procurement for CVN 80 and CVN 81.
2. Estimated costs pending completion of the service cost position estimate and competitive award of the detail design and construction contract in FY2020.
3. New ships planned for future procurement or for replacement of legacy ships are annotated with (X) until their class has been named, such as FFG(X) and T-ATS(X).
4. FY2021 represents incremental funding for the lead ship: FY2021=41% ($3.6B), FY2022=35% ($3.1B), FY2023=24% (2.1B).
5. Advance procurement funding for LHA 9 in FY2023 and first year full funding in FY2024
6. Funding for sustainment (maintenance, personnel, operations, etc.) is in addition to funding for shipbuilding (SCN), and is phased with delivery of battle force ships within the FYDP.

Notable FYDP procurement activity in the PB2020 budget submission includes:

- Two-ship procurement of CVN 80 and CVN 81, and the resulting shift in accounting of CVN 81 to FY2020. Note: the 2-ship procurement strategy does not alter the delivery schedule.
- Adding one *Virginia*-class ship in FY2020 (three total in FY2020), and projecting two-per-year steady state thereafter. Note: Because it was added to the shipbuilding plan this year, advance procurement funding was not programmed for the third FY2020 SSN, and consequently it will deliver over a longer timeframe, similar to a ship procured in FY2023.
- Shifting one DDG 51 Flight III earlier from FY2021 to FY2020 (three total in FY2020), and averaging 2.5 per year steady state thereafter.
- Adding one FFG(X) in FY2021 (two total FY2021), and projecting 2 per year steady state thereafter.
- Procuring lead *Columbia*-class SSBN in FY2021, the second in FY2024, with serial production beginning in FY2026 (advanced procurement partial funding begins in FY2023).
- Shifting one T-AO 205 from FY2021 to FY2020.
- Procuring the final T-ESB in FY2023, continuing procurement of T-ATS(X), and procuring T-AGOS(X) starting in FY2022.

Appendix 2

Long-Range Naval Vessel Inventory

Summarizing from section VI of the main report, the overarching plan in support of the *National Defense Strategy* continues to be the *Navy the Nation Needs,* and the three driving elements continue to be readiness, capability and capacity, all of which must remain balanced and scalable in order to field credible naval power. Whether growing or shrinking the force, a disciplined approach ensures force structure growth (capacity) accounts for commensurate, properly phased investments in readiness and capability – including manning, support, training, infrastructure, networks, and operations.

The FY2020 shipbuilding plan is complemented by the *2018 Shipyard Infrastructure Optimization Plan* and the *Annual Long Range Plan for the Maintenance and Modernization of Naval Vessels for Fiscal Year 2020* under three enduring shipbuilding imperatives explained in the main report: (1) steady, sustainable growth that establishes baseline acquisition profiles to promote predictability and efficiency; (2) aggressive growth that more quickly attains the requirement through additional industrial capacity and increased resources; and, (3) service life extensions that help manage ship inventories (ramps and dips).

Tables A2-1 thru A2-4 and figures A2-1 and A2-2 depict the construction and delivery plan assuming steady, sustainable procurement. The mid- and far-term periods beyond FY2024 become less precise, but provide a base from which to respond to changes in future technology, candidate service life extensions, or threat-based fleet design and architecture decisions. The plan values agility, adaptability, and commonality as key attributes for future platforms – providing warfighting commanders composable capabilities in contested environments across all phases of warfare. This plan results in the battle force inventory shown in Table A2-4, indicating the projected number of ships in service on the last day of each fiscal year. This plan addresses the Navy's most critical shipbuilding needs:

- Reaches and sustains the aggregate inventory of 355 battle force ships 20 years earlier than last year's plan.
- Removes the previous inventory dip and provides a continuous ramp to 355 ships, resulting in a predictable forecast for fleet planners, shipbuilders and the numerous supporting acquisition programs and enablers.
- Includes the two-ship aircraft carrier procurement (CVN 80 and CVN 81), garnering significant savings while protecting the industrial base for the more capable *Ford*-class.
- Includes the positive combined impact of the shipbuilding imperatives and stable, on-time funding (absent a continuing resolution), providing a more predictable backdrop for the industrial base.
- Provides near, mid, and long-term visibility into timeframes for introducing new or evolved platforms such as the next generation attack and payload based submarines, small and large surface combatants, and logistics and support ships.

Table A2-1. Long-Range Procurement Profile

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Aircraft Carrier	1								1				1				1				1				1				1	
Large Surface Combatant	3	2	2	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3
Small Surface Combatant	1	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Attack Submarines	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ballistic Missile Submarines		1			1		1	1	1	1	1	1	1	1	1	1														
Large Payload Submarines																	1			1			1			1			1	
Amphibious Warfare Ships		1		1	1	1	1	2	1	1	1	2	1	1	2				1		1	1	1		1	2	1	1	2	1
Combat Logistics Force	2	1	1	2	1	1	1	1	1	1	1	1	1	1										1		2	2	2	2	2
Support Vessels	2	1	2	3	1	2	2	1	1	1	2	2	2	2	2	1														3
Total New Construction Plan	12	10	9	13	11	11	11	12	11	11	10	13	12	12	11	9	8	7	7	8	8	8	8	8	8	12	9	10	12	13

Table A2-2. Battle Force Delivery Plan

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Aircraft Carrier					1				1				1					1				1				1				1
Large Surface Combatant	4	2	3	2	1	3	2	5	4	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3
Small Surface Combatant	2	3	2	5	3		1	2	3	2	2	2	2	2	2	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Attack Submarines	3	2	2	3		1	3	1	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ballistic Missile Submarines									1			1		1	1	1	1	1	1	1	1	1	1							
Large Payload Submarines																								1			1			1
Amphibious Warfare Ships		1		1	1	1	1		1		1	1	1	2	1	1	2	1	1	2	1			1		1	2		1	1
Combat Logistics Force		2	1	1	2	2	1	2	1	1	1	1	1	1	1	1	1										1	2	2	2
Support Vessels	1	2	6	2	1	2	2	1	1	2	2	1	1	2	2	2	2	1		2										
Total New Construction Deliveries	10	12	14	14	9	9	10	11	15	11	12	11	10	13	11	14	12	11	8	12	8	9	7	9	6	9	10	9	9	12

Table A2-3. Battle Force Retirement Plan

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Aircraft Carrier					-1	-1		-1					-1					-1			-1		-1				-1			
Large Surface Combatant		-4	-2		-2	-2	-1	-1	-2	-1						-6	-7	-5	-1	-6	-2	-4		-1	-1	-5	-3	-2		-4
Small Surface Combatant	-3		-2	-6										-1		-1		-1	-1		-1	-3	-3	-5	-4	-2	-3	-2	-5	-3
Attack Submarines	-2	-1	-3	-4	-4	-4	-3	-3	-3	-1	-1		-1			-1			-3	-1	-1	-2		-2	-1	-1	-1	-1	-1	-1
Cruise Missile Submarines							-2	-1	-1																					
Ballistic Missile Submarines								-1	-1	-1	-1	-1		-1	-1	-1	-1	-2	-1	-1	-1									
Amphibious Warfare Ships								-1		-2	-1	-1	-1		-3	-3	-1	-1	-1		-1		-1	-1		-1	-1	-2	-1	-1
Combat Logistics Force		-1		-1	-1	-2	-2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1										-1	-2	-2	-3
Support Vessels		-2	-1		-1	-1	-1		-1	-2	-2	-2		-2	-2	-1	-2	-1	-1	-4	-1		-2							
Total Naval Force Retirements	-5	-8	-8	-11	-9	-10	-9	-9	-9	-8	-6	-5	-4	-5	-7	-14	-12	-11	-8	-12	-8	-9	-7	-9	-6	-9	-10	-9	-9	-12

Table A2-4. Battle Force Inventory

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Aircraft Carrier	11	11	11	11	11	10	10	9	10	10	10	10	10	10	10	10	10	10	10	10	9	10	9	9	9	10	9	9	9	10
Large Surface Combatant	94	92	93	95	94	95	96	100	102	104	107	110	112	115	117	114	109	107	108	105	105	104	106	108	109	107	106	107	109	108
Small Surface Combatant	30	33	33	32	35	35	36	38	41	43	45	47	49	50	52	55	57	58	59	61	62	61	60	57	55	55	54	54	51	50
Attack Submarines	52	53	52	51	47	44	44	42	42	44	46	48	49	51	53	54	56	58	57	58	59	59	61	61	62	63	64	65	66	67
SSGNs/Large Payload Submarines	4	4	4	4	4	4	2	1																1	1	1	2	2	2	3
Ballistic Missile Submarines	14	14	14	14	14	14	14	13	13	12	11	11	11	11	11	11	11	10	10	10	10	11	12	12	12	12	12	12	12	12
Amphibious Warfare Ships	33	34	34	35	36	37	38	37	38	36	36	36	36	38	36	34	35	35	35	37	37	37	36	36	36	36	37	35	35	35
Combat Logistics Force	29	30	31	31	32	32	31	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	31
Support Vessels	34	34	39	41	41	42	43	44	44	44	44	43	44	44	44	45	45	45	44	42	41	41	39	39	39	39	39	39	39	39
Total Naval Force Inventory	301	305	311	314	314	313	314	316	322	325	331	337	343	351	355	355	355	355	355	355	355	355	355	355	355	355	355	355	355	355

Figure A2-1. PB2020 vs. PB2019 Comparison

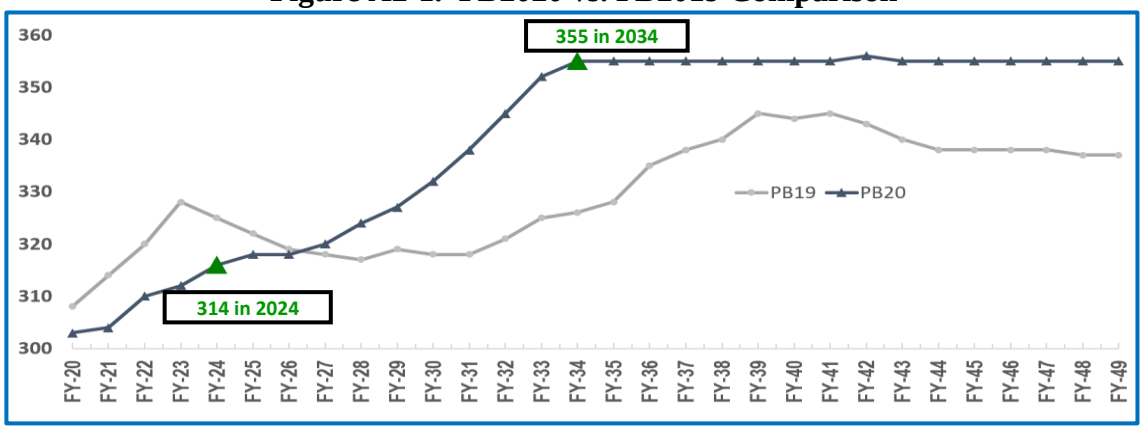
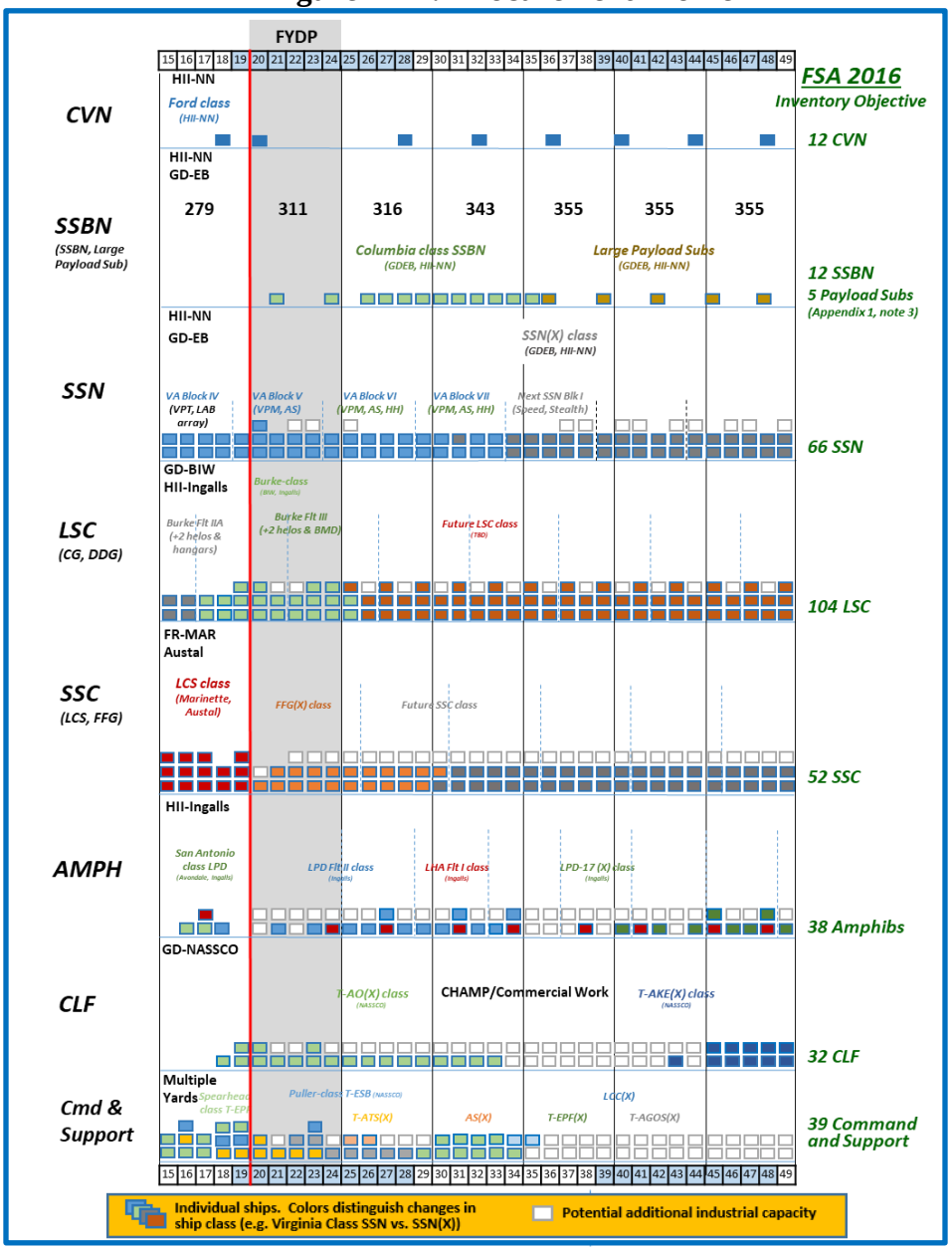


Figure A2-2. Procurement Profile



Appendix 3

Shipbuilding Industrial Base

Defense Industrial Base

Over the previous six decades 14 defense-related new construction shipyards have closed, 3 have left the defense industry, and one new shipyard has opened (Table A3-1). Today, the Navy contracts primarily with seven private new construction shipyards under four prime contractors to build our future battle force – far less capacity than our principal competitors. Reduced funding over time caused a parallel contraction of the even more fragile sub-vendor base. Although efforts are underway to quantify this fragility in the context of long-term health and responsiveness, the work is slow and complex. The Navy will continue to research and pursue opportunities across all participants in both the defense and commercial industrial base (see September 2018 Report to Congress *Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States*).

To summarize the full explanation provided in Appendix 4 of last year's report, and to keep a clear eye on historical context, the "boom and bust" profiles of the last 60 plus years resulted in sharp peaks followed by significant valleys (sometimes breaks) in production. The historic examples shown in last year's plan provided insight into why workforce experience and efficiency has become more difficult to reconstitute, and how that has fundamentally contributed to longer, more expensive shipbuilding timelines. The buildup in the 1950s and 1980s, followed by "bust" periods of little production, each led to the loss of portions of our shipbuilding industrial base. The "boom" periods also led to large-scale, block obsolescence as types/classes of ships reached (or will reach) the end of their service lives simultaneously, ultimately driving the need for another "boom" to recover. We are at a level of fragility that, without consistent and continuous commitment to steady acquisition profiles as proposed in this plan the industrial base will continue to struggle and some elements may not recover from another "boom/bust" cycle.

The stable, affordable baseline shipbuilding profiles that must be protected to preserve our industrial base and establish an aggressive, forward-looking, competitive posture are shown in Appendix 2 of this report. These profiles promote, above all else, a stable, efficient workforce that can adapt to incorporating new requirements, complete modernization and maintenance efforts on time, respond to emerging disruptive capabilities, and adeptly move to new platform designs. Industry recognizes its critical role and has shown a strong desire to drive improved performance to meet Navy's needs. The Navy's role is to partner with industry to define and establish workable requirements and to partner with Congress to sustain predictable profiles. This in turn provides clarity and confidence that will inform industry investment in capital improvement and expansion, research and development, and a world-class workforce.

Commercial Industrial Base

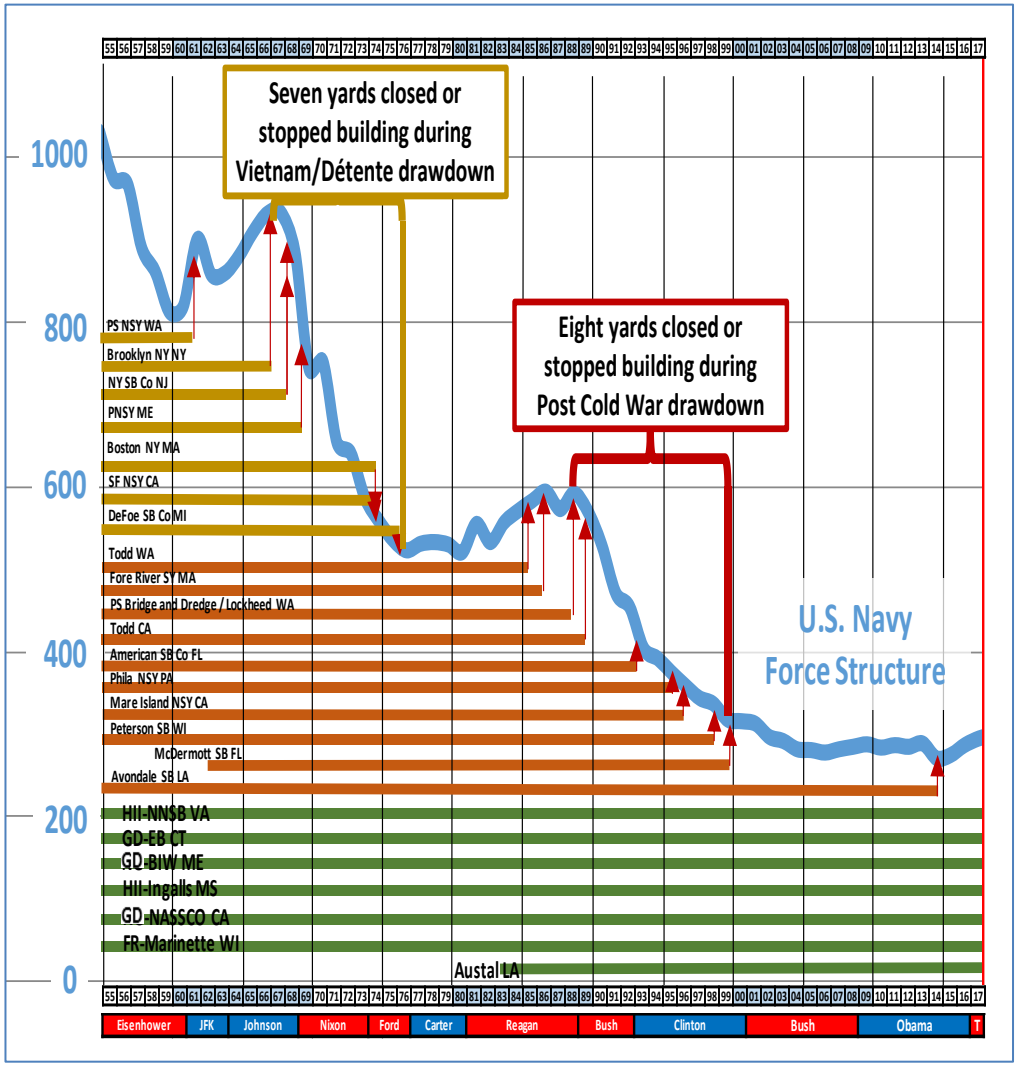
On the heels of recovering the battle force, recapitalizing the auxiliary and sealift fleet in support of DMO has become a top priority, and this operational concept is anticipated to generate requirement growth in multiple logistics lines. Regrettably, the same austerity factors that drove the investment imbalance across readiness–capability–capacity of the battle force, also deferred timely reinvestment in the auxiliary and sealift fleet. In parallel, the commercial industry supporting our auxiliaries and sealift has atrophied due to increased foreign competition through modernized

facilities and inexpensive labor. A contributing factor was policy legislation that ended U.S. Government shipyard subsidies, putting the U.S. industry at a considerable disadvantage compared to subsidized overseas competitors.

Three U.S. shipyards currently build ocean-going commercial ships – NASSCO (San Diego), VT Halter (Pascagoula) and Philly Shipyard (Philadelphia). To varying degrees, these shipyards have developed processes similar to their overseas competitors, but still face steep relative penalties in labor rates, environmental controls, and insurance. The combined effect is a limited set of options for long-term recapitalization of the U.S. sealift fleet, options that generally include service life extensions of ships already 40-50 years old, limited authority to purchase inexpensive used, but foreign built vessels (less than 20 years old), or buying new U.S. built ships at a significant cost premium over foreign-built ships – all making it challenging and expensive to remain competitive.

The Navy looks forward to working with Congress and government agencies to first bolster the U.S. commercial shipbuilding industry, and then to open the aperture on near-term options regarding purchasing or leasing used ships.

Figure A3-1 New Construction Industrial Base



Appendix 4

Annual Funding for Ship Construction

The funding in this report is in FY19 constant dollars using a 2.8 percent shipbuilding composite inflation rate (SCIR).[1] Figure A4-1 depicts the estimated funding required to achieve the battle force inventories proposed in Appendix 2. Average ship construction funding is $20.3B per year across the FYDP, and $26B to $28B per year beyond the FYDP in order to sustain steady acquisition profiles (shipbuilding 1st imperative), and also account for the serial production of *Columbia* and the evolving DMO logistics requirement discussed in Appendix 7. The fiscal impact of *Columbia*, last recapitalized from FY1974 to FY1989, begins in FY2023 with advanced procurement, and then increases in FY2026 with annual full procurements. This represents Navy's largest fiscal challenge for near-term future budgets and could impact the pace of procuring other ship types – potentially causing a drop below the steady profiles in Appendix 2.

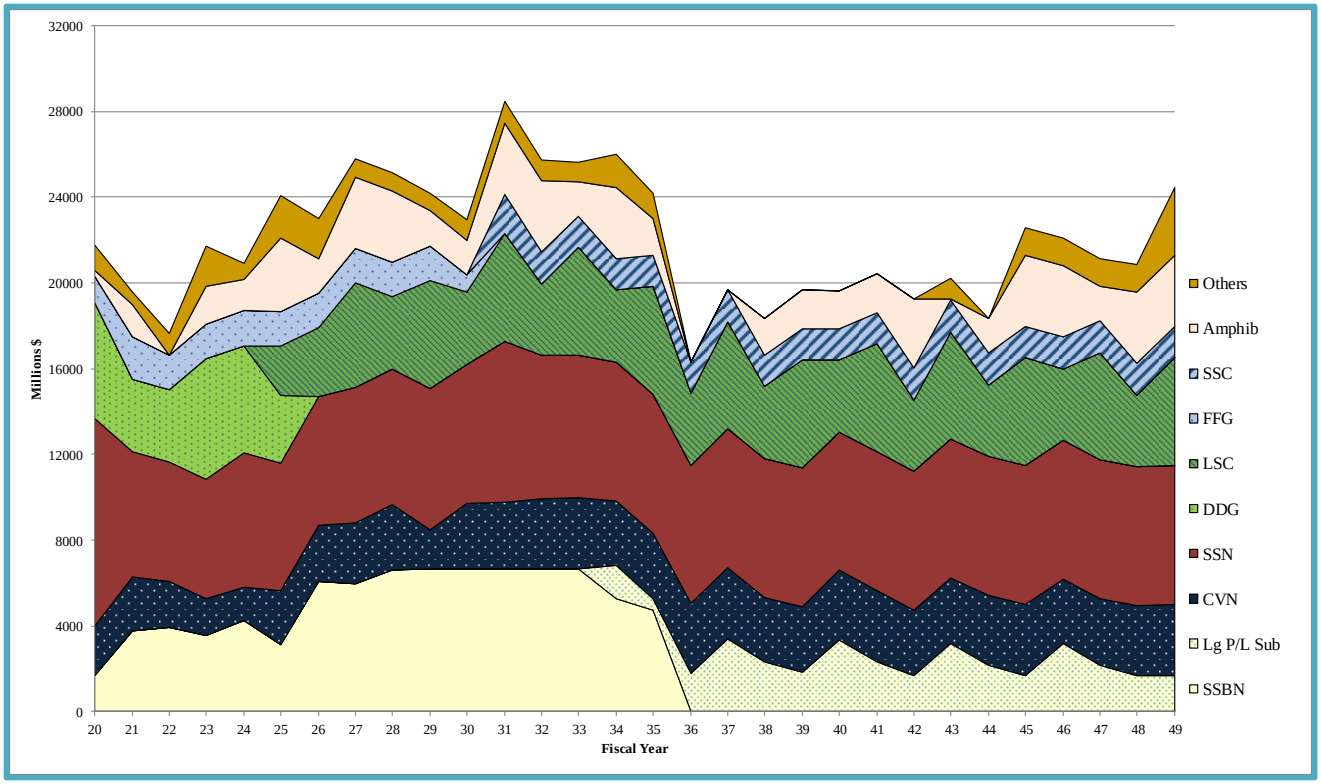
The cost to sustain a larger Navy is in addition to shipbuilding funding and is phased within the appropriate accounts across the FYDP to match ship deliveries (manning, support, training, infrastructure, etc.). Appendix 5 illuminates the cost of owning and operating a significantly larger Navy and discusses estimated operations and sustainment costs, projected to FY2034 when the fleet reaches 355 ships. Appendix 7 discusses the growing logistics requirement in the context of DMO and illustrates opportunities being pursued to recapitalize the auxiliary fleet.

As a result of the healthy adjustments in this year's plan that removed the inventory dip from FY2026 to FY2031, the resulting steady ramp to 355 has begun to smooth some of the peaks and valleys from last year's plan, trending towards more predictability and efficiency. The peaks during the first half of the 30-year plan are predominantly driven by the next generation LSC and the introduction of *Columbia*; and, during the second half by the completion of *Columbia* and the start of the next generation payload-based submarine.

Next generation ships and submarines are in the early stages of requirements definition, and their uncertainty compounds deeper into the plan. Costs are estimated and their impact on overall force mix will be determined within the FSA process. The baseline acquisition profiles provide a hedge against this uncertainty and reinforces long-term workforce stability for thoughtful, agile modernization and a clearer forecast of when to evolve to the next ship design.

[1] The shipbuilding composite inflation rate is a weighted average of shipbuilding costs across the shipbuilding industrial base. This inflation rate is developed using historic shipbuilding costs and projected future pricing for each shipyard. While historically it has been up to three percentage points higher than general inflation, this gap is projected to narrow to less than one percentage in the future.

Figure A4-1. Annual Funding for Ship Construction (FY2020-2049)



Appendix 5

Sustainment Cost

In response to NDAA FY2019 direction, this appendix illuminates cost considerations of owning and operating a larger force in support of the constitutional imperative to "provide and maintain a Navy." The Navy has been getting smaller for the last four decades, recently falling below 280 total ships, with aggressive measures now in place to reverse this trend in response to the reemergence of Great Power Competition and the attendant larger, threat-based FSA requirement of 355 battle force ships. Coincident with the relatively new dynamic of purchasing more ships to grow the force instead of simply replacing ships or shrinking the force, is the responsibility to "own" the additional inventory when it arrives.

Consistent annual funding in the shipbuilding account is foundational for an efficient industrial base in support of steady growth and long-term maintenance planning, but equally important is the properly phased, additional funding needed for operations and sustainment accounts as each new ship is delivered – the much larger fiscal burden over the life of a ship and the essence of the challenge to remain balanced across the three integral elements of readiness–capability–capacity. Because the Navy has been shrinking not growing, and because of the disconnected timespan from purchase to delivery, often five years or more and often beyond the FYDP, there is risk of underestimating the aggregate sustainment costs looming over the horizon that must now be carefully considered in fiscal forecasting.

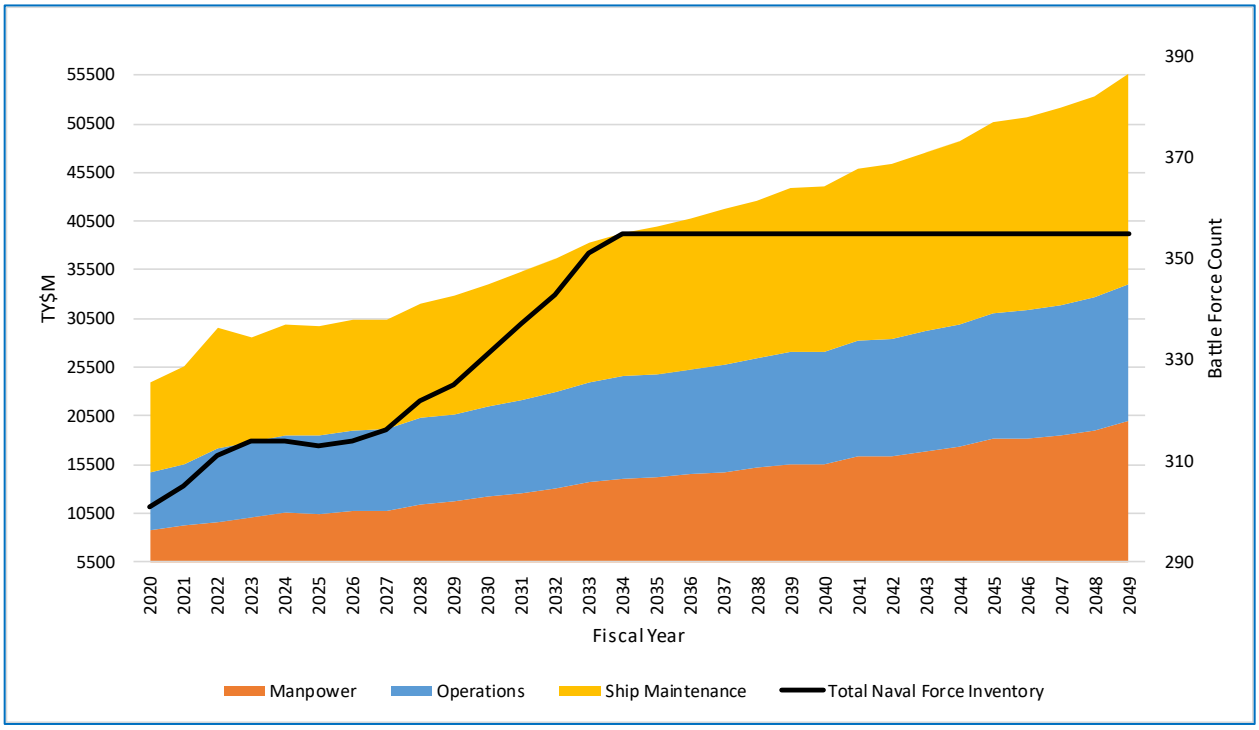
For a ship, the rough rule of thumb for cost is 30 percent for procurement and 70 percent for operating and sustainment; for example, a ship that costs $1B to buy costs $3.3B to own, amortized over its lifespan. Accordingly, multi-ship deliveries can add hundreds of millions of dollars to a budget year, and then require the same funding per year thereafter, compounded by additional deliveries in subsequent years and only offset by ship retirements, which lag deliveries when growing the force. A similar dynamic occurs when the life of a ship is extended. Sustainment resources programmed to shift from a retiring ship to a new ship must now stay in place – for the duration of the extension. The burden continues to grow until equilibrium is reached at the desired higher inventory, when deliveries match retirements and all resourcing accounts reach steady-state at a higher, enduring sustainment cost.

For perspective, the current budget, among the largest ever, supports a modern fleet of approximately 300 ships, nearly 20 percent fewer than the goal of 355. The battle force inventory shown in Appendix 3 rises from 301 ships in FY2020 to 314 ships in FY2024, and then 355 in FY2034. The programmed sustainment cost in Table A5-1 is $24B in FY2020 and rises to $30B in FY2024 in TY$. When the battle force inventory reaches 355 in FY2034, estimated cost to sustain that fleet will approach $40B (TY$), 32% higher than in FY2024. For now, included in this sustainment estimate are only personnel, planned maintenance, and some operations; representing those costs tied directly to owning and operating a ship, easily modeled today, and already line-item accounted for in the budget. Equally important additional costs, but not yet included in the future estimate, are those not easily associated with individual ships and require complex modeling for long-term forecasting (beyond 3 to 5 years), such as the balance of the operations accounts (market and schedule driven), modernization and ordnance (threat and technology driven), infrastructure and training (services spread across many ships), aviation detachments, networks and cyber support, plus others. The sustainment cost in Figure A5-1 represents the FYDP programmed cost for direct costs discussed above, and then inflated forward using Office of the Secretary of Defense indices applied

to the deliveries in Appendix 2.

Less of a challenge when shrinking the force, the Navy is now working towards developing the complex model needed to capture indirect costs for growing the force. Until then, macro ratios are helpful in estimating rough orders of magnitude beyond the FYDP and for identifying future areas of concern. Similar to procurement, estimates will be less precise deeper into the plan. Recovering from the long-term investment imbalance has proven to be costly, particularly in the readiness accounts. As readiness becomes more accurately defined, the modeling will improve and so will the ability to more accurately forecast. However, no matter the method, the anticipated cost of sustaining the proper mix of 355 ships is anticipated to be substantial, and reform efforts and balanced scalability will continue to be the drivers going forward. An example is the *Ford*-class, which has implemented designs that reduce the cost of sustainment by over $100M per year compared to the previous *Nimitz* class, equating to over $4B in savings across the life of the ship.

Figure A5-1. Annual Funding for Sustainment (FY2020-2049)[1]



[1] Shows personnel, maintenance and operations programmed in the FYDP for ships in the battle force by ship type. Beyond the FYDP, the funding is inflated from FY24, again by projected ship type (mix varies by year).

Appendix 6

Decommissionings, Dismantlings, and Disposals during FY2020-FY2024 Future-Years Defense Program (FYDP)

Ships to be placed out of service during the FYDP.

Table A6-l lists the battle force ships to be placed out of service within the FYDP, and their planned disposition. Balanced with steady procurement, the healthy replacement of old with new provides increasing capability over time and ensures no unanticipated gaps in warfighting capability. When matched with steady acquisition profiles, the retirement plan is useful in managing inventory without unintended, excessive reduction in ship count due to a previous "boom" era that results in a glut of ships leaving inventory over a short period of time.

Table A6-1. Ships planned to be placed out of service[1] during the FYDP

Inactivation Year (FY) – Total Ships	Ship Name/Designation/Hull Number	Disposition
2020 – 5 Ships	USS OLYMPIA (SSN 717)	Dismantle
	USS LOUISVILLE (SSN 724)	Dismantle
	USS CHAMPION (MCM 4)[2]	LSA
	USS SCOUT (MCM 8)	LSA
	USS ARDENT (MCM 12)	LSA
2021 – 8 Ships	USS BUNKER HILL (CG 52)	OCIR[3]
	USS MOBILE BAY (CG 53)	OCIR
	USS ANTIETAM (CG 54)	OCIR
	USS LEYTE GULF (CG 55)	OCIR
	USS HELENA (SSN 725)	Dismantle
	USNS SIOUX (T-ATF 171)	Dismantle
	USNS APACHE (T-ATF 172)	Dismantle
	USNS WALTER S DIEHL (T-AO 193)	Dismantle
2022 – 8 Ships	USS OKLAHOMA CITY (SSN 723)	Dismantle
	USS PROVIDENCE (SSN 719)	Dismantle
	USS SAN JACINTO (CG 56)	TBD
	USS LAKE CHAMPLAIN (CG 57)	TBD
	USS PATRIOT (MCM 7)	Dismantle
	USS PIONEER (MCM 9)	Dismantle
	USS SAN JUAN (SSN 751)	Dismantle
	USNS CATAWBA (T-ATF 168)	Dismantle
2023 – 11 Ships	USS CHICAGO (SSN 721)	Dismantle
	USS KEY WEST (SSN 722)	Dismantle
	USS PASADENA (SSN 752)	Dismantle
	USS ALBANY (SSN 753)	Dismantle
	USNS LEROY GRUMMAN (T-AO 195)	OSIR
	USS SENTRY (MCM 3)	Dismantle
	USS DEVASTATOR (MCM 6)	Dismantle
	USS WARRIOR (MCM 10)	Dismantle
	USS GLADIATOR (MCM 11)	Dismantle
	USS DEXTROUS (MCM 13)	Dismantle
	USS CHIEF (MCM 14)	Dismantle

2024 – 9 Ships	USS HARRY S TRUMAN (CVN 75)	Dismantle
	USS PHILIPPINE SEA (CG 58)	TBD
	USS PRINCETON (CG 59)	TBD
	USS NEWPORT NEWS (SSN 750)	Dismantle
	USS TOPEKA (SSN 754)	Dismantle
	USS ALEXANDRIA (SSN 757)	Dismantle
	USS ASHEVILLE (SSN 758)	Dismantle
	USNS JOSHUA HUMPHREYS (T-AO 188)	OSIR
	USNS GRASP (T-ARS 51)	Dismantle

Notes:

1. US Navy vessels are commissioned ships that are decommissioned and removed from active status. USNS vessels are non-commissioned vessels that are placed out of service.
2. MCM ships in FY20 are CONUS based and will used as Logistic Support Asset (LSA) to provide parts (no longer manufactured) for the permanently deployed overseas MCM ships.
3. Out of Commission in Reserve (OCIR) ships will be retained on the Naval Vessel Register as reactivation candidates, which would include an SLE effort.

Ships planned for dismantling and disposal during the FYDP

Prior to final disposition, ships reaching the end of their service lives are evaluated for additional use through intra-agency or inter-agency transfer, foreign military sales (FMS), fleet training, or weapons testing. Ships designated for FMS are retained in a hold status for no more than two years in accordance with Navy policy.

The Navy intends to dismantle the ships listed in Table A6-2 within the FYDP. Specific dates will be determined when the ships are contracted for scrapping or recycling.

Table A6-2. Ships Planned for Disposal by Dismantling

Ex-PONCE (AFSB(I) 15)	Ex-DENVER (LPD 9)
Ex-HAYES (AG 195)	Ex-JUNEAU (LPD 10)
Ex-NAVAJO (ATF 169)	Ex-SHREVEPORT (LPD 12)
Ex-MOHAWK (ATF 170)	Ex-NASHVILLE (LPD 13)
Ex-TICONDEROGA (CG 47)	Ex-BOULDER (LST 1190)
Ex-YORKTOWN (CG 48)	Ex-CANON (PG 90)
Ex-KITTY HAWK (CV 63)	USS CHAMPION (MCM 4)
Ex-JOHN F KENNEDY (CV 67)	USS SCOUT (MCM 8)
Ex-BARRY (DD 933)	USS ARDENT (MCM 12)
Ex-CHARLES F ADAMS (DDG 2)	USNS WALTER S DIEHL (T-AO 193)
Ex-BOONE (FFG 28)	USNS SIOUX (ATF 171)
Ex-STEPHEN W GROVES (FFG 29)	USNS APACHE (ATF 172)
Ex-JOHN L HALL (FFG 32)	USNS CATAWBA (ATF 168)
Ex-UNDERWOOD (FFG 36)	USS SENTRY (MCM 3)
Ex-NICHOLAS (FFG 47)	USS DEVASTATOR (MCM 6)
Ex-HAWES (FFG 53)	USS PATRIOT (MCM 7)
Ex-SAMUEL B ROBERTS (FFG 58)	USS PIONEER (MCM 9)
Ex-CHARLESTON (LKA 113)	USS WARRIOR (MCM 10)
Ex-MOBILE (LKA 115)	USS GLADIATOR (MCM 11)
Ex-EL PASO (LKA 117)	USS DEXTROUS (MCM 13)
Ex-CLEVELAND (LPD 7)	USS CHIEF (MCM 14)
Ex-DUBUQUE (LPD 8)	USNS GRASP (T-ARS 51)

Table A6-3 lists the ships that will be used for fleet training in support of Rim of the Pacific (RIMPAC) and Valiant Shield training exercises that will occur during the FYDP. The training will include using selected decommissioned ships as targets for live-fire weapons employment, referred to as a "sinking exercise" (SINKEX). The Chief of Naval Operations (CNO) guidelines authorize SINKEXs when: (1) the event is required to satisfy Title 10 requirements for ship survivability or weapons lethality evaluation; or (2) the event supports major joint or multi-national exercises or evaluation of significant new multi-unit tactics or tactics and weapons combinations.

Table A6-3. Ships Planned for use in Future Fleet Training Exercises

Ex-CURTS (FFG 38)	Ex-FORD (FFG 54)
Ex-RODNEY M DAVIS (FFG 60)	Ex-INGRAHAM (FFG 61)
Ex-VANDEGRIFT (FFG 48)	Ex-DURHAM (LKA 114)

Summary

Per the annual Ship Disposition Review conducted on January 16th, 2019, Navy will retire 41 battle force ships within the FYDP (Table A6-1), with several awaiting final disposition as discussed above. 50 previously retired ships will be processed for disposal, 44 through dismantling (Table A6-2), and 6 through fleet training support (Table A6-3).

Appendix 7

Auxiliary and Sealift Vessel Plan

Auxiliary and sealift vessels provide support to the battle force, shore-based facilities, and broader national defense missions. Recapitalizing the auxiliary and sealift fleet in support of DMO has become a top priority. The initial reviews of the requirements to support this operational maritime concept indicate potential growth across the five lines of effort: refuel, rearm, resupply, repair, and revive. Coincident is the review of the level of effort needed to distribute logistics into a contested maritime environment following safe transfer by the logistics fleet – smaller, faster, multi-mission transports likely resident within the future battle force. The work to fully flesh out the requirement is ongoing, but the aggregate is expected to be no less than the current requirement, reinforcing the urgency to recapitalize the current fleet. This appendix focuses on the non-battle force shortfalls, including aviation support vessels, hospital ships, and roll-on/roll-off (RO/RO) sealift vessels featured in the March 2018 report *Sealift That the Nation Needs*.

CHAMPs

The Common Hull Auxiliary Multi-Mission Platforms (CHAMPs) concept is a new-construction design effort using common hulls to potentially recapitalize five different missions: sealift, aviation logistics support, hospital, repair tender, and command and control. Aviation and hospital ships have or will be extended to the 2030s and will eventually be replaced by CHAMPs or a commercial derivative. Repair tenders and command ships will also be replaced by CHAMPS, but are accounted for in the battle force and not included in this appendix.

The Navy has funded CHAMPs development and has approved top level requirements (TLRs) as the basis for industry studies. The request for proposal for these studies was released 2nd quarter of FY2019 and both Capability Development Documents (CDD) and Concepts of Operations (CONOP) reviews are in progress. Although early in the process, upfront collaboration with industry on CHAMP options has indicated two hull designs may be needed to meet both RO/RO and non-RO/RO requirements, in lieu of significant compromise and increased cost across the five mission areas. As program options and costs mature, additional detail will become available.

This appendix shows an initial procurement of the sealift variant in FY2025 and delivery in FY2028, with the intention to accelerate procurement for a FY2026 delivery. This acceleration would meet the conditions of the FY2019 NDAA option authorizing Navy to buy an additional five used, foreign built vessels if able to deliver a new, U.S. built product by FY2026, a potentially expensive and problematic option within the context of the struggling U.S. commercial shipbuilding industry discussed in Appendix 3. The limited set of options being pursued in earnest to recapitalize the fleet per the *Sealift That the Nation Needs* generally include service life extensions of ships already 40-50 years old, limited authority to purchase inexpensive used, but foreign built vessels (less than 20 years old), or buying new U.S. built ships at a significant cost premium over foreign-built ships – all making it challenging and expensive to remain competitive.

The Navy looks forward to working with Congress and government agencies to first bolster the U.S. commercial shipbuilding industry, and then to open the aperture on near-term options regarding purchasing or leasing used ships.

Sealift and Auxiliary Recapitalization

Tables A7-1 and A7-2 show the intended plan for the procurement of new sealift and non-battle force auxiliaries through the CHAMPs effort, and the procurement of used sealift as an option to maintain inventory. The *Sealift that the Nation Needs* report defines the overall requirement of 18 new and 26 used sealift vessels. As approved by Congress, Navy will procure two used, foreign-built ships within the FYDP, and has conditioned-based authority to buy five more. Tables A7-3 and A7-4 show the anticipated retirement plan and long-range inventory.

Table A7-1. Long-Range Procurement Plan

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Sealift (New)						1		1	1	1	2	2	2	2	2	2	2													
Sealift (Used)		1	1			2	2		2	3	3	1	2	2	3	2		2												
Aviation									1	1																				
Hospital														1	1															
Total Procurement Plan		**1**	**1**			**3**	**2**	**1**	**4**	**5**	**5**	**3**	**4**	**5**	**6**	**4**	**2**													

Table A7-2. Long-Range Delivery Plan

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Sealift (New)									1	1	1	1	2	2	2	2	2	2	2											
Sealift (Used)			1	1			2	2		2	3	3	1	2	2	3	2		2											
Aviation												1	1																	
Hospital																	1	1												
Total Deliveries			**1**	**1**			**2**	**2**	**1**	**3**	**4**	**5**	**4**	**4**	**4**	**5**	**5**	**3**	**4**											

Table A7-3. Long-Range Auxiliary Retirement Plan

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Sealift						-1	-5	-3	-2	-5	-4	-3	-6	-1	-4	-6	-5			-1										
Aviation												-1	-1																	
Hospital																	-1	-1												
Total Retirements						**-1**	**-5**	**-3**	**-2**	**-5**	**-4**	**-4**	**-7**	**-1**	**-4**	**-6**	**-6**	**-1**		**-1**										

Table A7-4. Long-Range Auxiliary Inventory

Fiscal Year	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Sealift	62	62	63	64	64	63	60	59	58	56	56	57	54	57	57	56	55	57	61	60	60	60	60	60	60	60	60	60	60	60
Aviation	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Hospital	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total Inventory	**66**	**66**	**67**	**68**	**68**	**67**	**64**	**63**	**62**	**60**	**60**	**61**	**58**	**61**	**61**	**60**	**59**	**61**	**65**	**64**	**64**	**64**	**64**	**64**	**64**	**64**	**64**	**64**	**64**	**64**